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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XF926

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Site Characterization Surveys off the Coast of Massachusetts

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to high-resolution geophysical (HRG) survey investigations associated with marine site characterization activities off the coast of Massachusetts in the area of the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0500) and along cable routes to the coast of Massachusetts (the Study Area).

DATES: This Authorization is valid for one year from the date of issuance.

FOR FURTHER INFORMATION CONTACT: Dale Youngkin, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-construction-activities. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq.*) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth.

NMFS has defined “negligible impact” in 50 CFR 216.103 as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

The MMPA states that the term “take” means to harass, hunt, capture, kill or attempt to harass, hunt, capture, or kill any marine mammal.

Except with respect to certain activities not pertinent here, the MMPA defines “harassment” as any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Summary of Request

On October 20, 2017 NMFS received an application from Bay State Wind for the taking of marine mammals incidental to site characterization investigations off the coast of Massachusetts in the OCS-A 0500 Study Area, designated and offered by the Bureau of Ocean Energy Management (BOEM), to support the development of an offshore wind project. Bay State Wind's request was for take, by Level A and Level B harassment, of a small number of 10 species or stocks of marine mammals. As there were changes to the proposed project activities and equipment proposed for use after this initial application submittal, a complete application was received in April, 2018. In addition, some species not originally considered for take have been authorized based on further consideration and coordination, so incidental take of 13 species/stocks have now been authorized. Neither the applicant nor NMFS expects serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

Description of the Specified Activity

Overview

Bay State Wind proposes to conduct HRG surveys in the Study Area to support the characterization of the existing seabed and subsurface geological conditions in the Study Area. This information is necessary to support the final siting, design, and installation of offshore project facilities, turbines and subsea cables within the project area as well as to collect the data necessary to support the review requirements associated with Section 106 of the National Historic Preservation Act of 1966, as amended. Underwater sound resulting from Bay State Wind's proposed site characterization surveys has the potential to result in incidental take of marine mammals. This take of marine mammals is anticipated to be in the form of harassment and no serious injury or mortality is anticipated, nor is any authorized in this IHA.

Dates and Duration

HRG surveys of the wind turbine generator (WTG) and offshore substation (OSS) areas are anticipated to commence upon issuance of the IHA and will last for approximately 60 days, including estimated weather down time. Likewise, the Export Cable Route HRG surveys are anticipated to commence upon issuance of the IHA and will last approximately 40 days (including estimated weather down time). Offshore and near coastal shallow water regions of the HRG survey will occur within the same 40-day timeframe.

Specified Geographic Region

Bay State Wind's survey activities will occur in the approximately 187,532-acre Lease Area designated and offered by BOEM, located approximately 14 miles (mi) south of Martha's Vineyard, Massachusetts at its closest point, as well as within 2 potential export cable routes to Somerset, MA and to Falmouth, MA (see Figure 1-1 of the IHA application). The Lease Area falls within the Massachusetts Wind Energy Area (MA WEA).

A detailed description of the planned survey activities, including types of survey equipment planned for use, is provided in the *Federal Register* notice for the proposed IHA (83 FR 22443; May 15, 2018). Since that time, no changes have been made to the planned activities. Therefore, a detailed description is not repeated here. Please refer to that *Federal Register* notice for the description of the specific activity.

Comments and Responses

NMFS published a notice of proposed IHA in the *Federal Register* on May 15, 2018 (83 FR 22443). During the 30-day public comment period, NMFS received comment letters from the Marine Mammal Commission (Commission) and a group of non-governmental organizations (NGOs) including Natural Resources Defense Council, the National Wildlife Federation, the

Conservation Law Foundation, Defenders of Wildlife, Southern Environmental Law Center, Surfrider Foundation, Sierra Club, and the International Fund for Animal Welfare. No other public comments were received. NMFS has posted the comment letters received online at: www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable. The U.S. Fish and Wildlife Service (USFWS) New England Field Office reviewed our proposal and had no comment. The following is a summary of the Commission comments received and NMFS's responses.

Comment 1: The Commission notes that impulsive thresholds, rather than non-impulsive thresholds, were incorrectly used to model Level A harassment zones for the ultra-short baseline positioning system (UBPS) and sub-bottom profiler (SBP) sources, which resulted in overly conservative Level A harassment zones. The Commission stated that the correct threshold should have been used, regardless of whether the incorrect threshold was more conservative, and NMFS should prohibit applicants from using impulsive thresholds for non-impulsive sources.

NMFS Response: NMFS appreciates the input from the Commission. We acknowledge the error, and have corrected it in this final notice (refer to Table 3) and IHA. Take by Level A harassment is not likely, even based on the larger (more conservative) isopleth associated with the impulsive threshold. The use of the non-impulsive threshold does not change our findings or determinations under the MMPA. NMFS does not allow applicants to arbitrarily choose which thresholds to use.

Comment 2: The Commission recommended that NMFS refrain from authorizing Level A harassment takes of harbor porpoises.

NMFS Response: Take by Level A harassment is not being authorized in this IHA.

Comment 3: The Commission recommended that, until behavioral thresholds are updated, NMFS require applicants to use the 120-decibel (dB) re 1 micropascal (μ Pa), rather than 160- dB re 1 μ Pa, threshold for acoustic, non-impulsive sources (*e.g.*, sub-bottom profilers / chirps, echosounders, and other sonars including side-scan and fish-finding).

NMFS Response: Certain sub-bottom profiling systems are appropriately considered to be impulsive sources (*e.g.*, boomers, sparkers); therefore, the threshold of 160 dB re 1 μ Pa will continue to be used for those sources. Other source types referenced by the Commission (*e.g.*, chirp sub-bottom profilers, echosounders, and other sonars including side-scan and fish-finding) produce signals that are not necessarily strictly impulsive; however, NMFS finds that the 160-dB root mean square (rms) threshold is most appropriate for use in evaluating potential behavioral impacts to marine mammals because the temporal characteristics (*i.e.*, intermittency) of these sources are better captured by this threshold. The 120-dB threshold is associated with continuous sources and was derived based on studies examining behavioral responses to drilling and dredging. Continuous sounds are those whose sound pressure level remains above that of the ambient sound, with negligibly small fluctuations in level (NIOSH, 1998; ANSI, 2005). Examples of sounds that NMFS would categorize as continuous are those associated with drilling or vibratory pile driving activities. Intermittent sounds are defined as sounds with interrupted levels of low or no sound (NIOSH, 1998). Thus, signals produced by these source types are not continuous but rather intermittent sounds. With regard to behavioral thresholds, we consider the temporal and spectral characteristics of signals produced by these source types to more closely resemble those of an impulse sound rather than a continuous sound. The threshold of 160 dB re 1 μ Pa is typically associated with impulsive sources, which are inherently intermittent. Therefore, the 160 dB threshold (typically associated with impulsive sources) is

more appropriate than the 120 dB threshold (typically associated with continuous sources) for estimating takes by behavioral harassment incidental to use of such sources.

Comment 4: The Commission noted during informal consultation that NMFS informed the Commission that Orsted (BSW) conducted sound source verification (SSV) on the triple plate boom plate, which resulted in a greatly reduced Level B harassment zone for that sound source. The Commission recommended that NMFS provide the SSV report to its technical experts for review prior to allowing the Level B harassment zone to be reduced based on these findings.

NMFS Response: NMFS has not revised the Level B harassment zone to support a recalculation of take based on this SSV report and does not intend to use the report to support different Level B harassment zones until and unless we are able to validate its findings based on technical review. NMFS has only recently received the SSV report from BSW and is currently reviewing it for potential use in future IHAs. Based on preliminary review of the report, it appears as though the actual Level B harassment isopleth for the Triple Plate Boomer would be no more than 100 m (and could be significantly less), which would equate to reduction in the ensonified area of at least 94%, as compared to the area associated with the 400-m Level B harassment zone that was modelled and presented in the notice of the proposed IHA (83 FR 22443, May 15, 2018).

Comment 5: The Commission noted that Risso's dolphins were observed during an HRG survey conducted by a different company (Deepwater Wind, LLC) in 2017 in the same general area (Rhode Island – Massachusetts Wind Energy Area, located east of Long Island, New York and south of Rhode Island and Massachusetts). The Commission recommended that NMFS

authorize at least 20 Level B harassment takes of this species based on encountering a group twice during the 60 days of the proposed activities.

NMFS Response: NMFS has added Level B harassment takes for Risso's dolphin. Out of an abundance of caution, authorized takes assume a group of 15 individuals encountered twice during the survey activities for a total of 30 authorized takes by Level B harassment.

Comment 6: The Commission states recommended that NMFS include takes of sei whales, Atlantic spotted dolphin, and long-finned pilot whales, ensuring that the number of takes authorized for each species is at least equal to the average group size of each species.

NMFS Response: NMFS' decision not to authorize take for sei whales is based on very low calculated takes (low expectation that take is likely to occur based on very conservative take estimates) coupled with the fact that these species are not expected to occur based on past monitoring reports from the area. Calculated takes (which take into account the duration of the survey activities as well as the low densities for this species) did not round up to one take for sei whales. If any species for which take is not authorized are encountered, Bay State Wind are required to implement measures to avoid take of these species and NMFS believes that, in the unlikely event that a sei whale is encountered, Bay State Wind will be able to effectively mitigate to avoid take of this large cetacean species. However, as Atlantic spotted dolphins and long-finned pilot whales are much smaller cetaceans (hence, potentially harder to see to avoid take in certain conditions), may occur in much larger groups, and calculations resulted in at least a small amount of take for pilot whales, NMFS has modified the IHA to authorize a small number of takes by Level B harassment for these species to avoid requiring the applicant to shut down operations for avoidance of take in the unlikely event they are encountered.

Comment 7: The Commission expressed concern that the method used to estimate the numbers of takes, which summed fractions of takes for each species across project days, does not account for and negates the intent of NMFS' 24-hour reset policy. The Commission recommended that NMFS share their rounding criteria guidance with the Commission in an expeditious manner.

NMFS Response: NMFS appreciates the Commission's ongoing concern in this matter. Calculating predicted takes is not an exact science and there are arguments for taking different mathematical approaches in different situations, and for making qualitative adjustments in other situations. We believe, however, that the methodology used for take calculation in this IHA remains appropriate and is not at odds with the 24-hour reset policy the Commission references. NMFS recently completed internal guidance on rounding and consideration of qualitative factors in the estimation of instances of take. NMFS' internal guidance on rounding and the consideration of qualitative factors in take estimation has been provided to the Commission.

Comment 8: The Commission recommended that NMFS better evaluate the number of Level A and B harassment takes it plans to propose by considering both ecological/biological information and results from previous monitoring reports for all proposed authorizations prior to submitting them for publication in the *Federal Register*.

NMFS Response: NMFS' reasoning takes into account past practice; what estimated take calculations yield; and what the applicant proposes, as well as a suite of situational and context factors such as the size of the zone; the likely effectiveness of the mitigation; and the behavior of the species in question when evaluating Level A and Level B harassment takes it proposes to authorize. NMFS also considers ecological/biological information and results from previous monitoring reports. The purpose of publishing the notice in the *Federal Register* is to obtain

feedback on the proposed IHA and, when warranted based on feedback received, we may determine it is appropriate to revise our proposed authorizations. More information regarding how NMFS estimates instances of take, including consideration of qualitative factors, was provided to the Commission on June 27, 2018.

Comment 9: The Commission recommended that NMFS require a standard 30-minute pre- and post- monitoring clearance monitoring period and 15-minute clearance times for small cetaceans and pinnipeds and a 30-minute clearance time for larger cetaceans after a delay or shut down.

NMFS Response: NMFS has revised the monitoring and clearance times as recommended by the Commission.

Comment 10: The Commission requested clarification regarding certain issues associated with NMFS' notice that one-year renewals could be issued in certain limited circumstances and expressed concern that the process would bypass the public notice and comment requirements. The Commission also suggested that NMFS should discuss the possibility of renewals through a more general route, such as a rulemaking, instead of notice in a specific authorization. The Commission further recommended that if NMFS did not pursue a more general route, that the agency provide the Commission and the public with a legal analysis supporting our conclusion that this process is consistent with the requirements of section 101(a)(5)(D) of the MMPA. The Commission also noted that NMFS had recently begun utilizing abbreviated notices, referencing relevant documents, to solicit public input and suggested that NMFS use these notices and solicit review in lieu of the currently proposed renewal process.

NMFS Response: The process of issuing a renewal IHA does not bypass the public notice and comment requirements of the MMPA. The notice of the proposed IHA expressly notifies the

public that under certain, limited conditions an applicant could seek a renewal IHA for an additional year. The notice describes the conditions under which such a renewal request could be considered and expressly seeks public comment in the event such a renewal is sought.

Additional reference to this solicitation of public comment has recently been added at the beginning of the FR notices that consider renewals, requesting input specifically on the possible renewal itself. NMFS appreciates the streamlining achieved by the use of abbreviated FR notices and intends to continue using them for proposed IHAs that include minor changes from previously issued IHAs, but which do not satisfy the renewal requirements. However, we believe our proposed method for issuing renewals meets statutory requirements and maximizes efficiency.

Importantly, such renewals would be limited to circumstances where: the activities are identical or nearly identical to those analyzed in the proposed IHA; monitoring does not indicate impacts that were not previously analyzed and authorized; and, the mitigation and monitoring requirements remain the same, all of which allow the public to comment on the appropriateness and effects of a renewal at the same time the public provides comments on the initial IHA. NMFS has, however, modified the language for future proposed IHAs to clarify that all IHAs, including renewal IHAs, are valid for no more than one year and that the agency would consider only one renewal for a project at this time. In addition, notice of issuance or denial of a renewal IHA would be published in the *Federal Register*, as they are for all IHAs. The option for issuing renewal IHAs has been in NMFS's incidental take regulations since 1996. We will provide any additional information to the Commission and consider posting a description of the renewal process on our website before any renewal is issued utilizing this process.

Comment 11: The Commission noted that in this instance, the public comment period closed on 14 June, 2018 which was two weeks after activities were scheduled to begin, as the final version of the application was not submitted until 5 April, 2018. The Commission recommended that NMFS take all steps necessary to ensure that it publishes and finalizes proposed IHAs far enough in advance of the planned start date to ensure full consideration is given to all comments received, noting this can only be accomplished if applicants provide their complete applications at the outset and respond to inquiries from NMFS in a timely manner.

NMFS Response: The delay in issuance of this IHA was specifically to allow for the needed public review and comment period and to allow NMFS time to fully consider the comments received. We have thoroughly reviewed the comments received and discussed many of these comments with the Commission during informal consultation. Where appropriate, we have revised the proposed authorization. In instances where we disagree with the proposed revision, we have explained why we have not revised the authorization. More generally, NMFS publishes FR notices for proposed IHAs as quickly as possible once the application is received, but we cannot control either short processing times driven by the date the activity is supposed to start or later publication of proposed IHAs resulting from back and forth with the applicants to ensure we have the necessary information.

Comment 12: The NGOs noted concern for the unusual mortality events (UME) that have been declared for humpback whales, minke whales, and North Atlantic right whales and expressed concern that the estimates derived from models presented in Roberts *et al.* (2016) may underrepresent density and seasonal presence of large whales in the survey area. The NGOs noted NMFS is required to use the best available science for species presence and densities, and recommended that NMFS consider additional data sources in density modeling in future analyses

of estimated take, including initial data from state monitoring efforts, existing passive acoustic monitoring data, opportunistic marine mammal sightings data, and other data sources.

NMFS Response: NMFS acknowledges the UMEs for minke whales since January 2017; north Atlantic right whales since June 2017; and humpback whales since January 2016. Please refer to the discussion of these UMEs in the Negligible Impact Determination section of this notice.

NMFS has determined that the data provided by Roberts *et al.* (2016) represents the best available information concerning marine mammal density in the survey area and has used it accordingly. NMFS has considered other available information, including that cited by the commenters, and determined that it does not contradict the information provided by Roberts *et al.* (2016). The sources suggested by the commenters do not provide data in a format that is directly usable in an acoustic exposure analysis. We will continue to review data sources, including those recommended by commenters for consideration for their suitability for inclusion in future analyses to ensure the use of best available science in our analyses.

In addition to considering the density estimates, NMFS has reviewed past monitoring reports from the survey area. In 2016, one fin and two minke whales were observed during surveys at distances ranging from 1,000 to 2,000 m from the source. In 2017 there were 5 minke whales and 13 fin whales observed while on survey with only one of these being close enough to be considered a take by Level B harassment. Review of past monitoring reports confirm that large whales are not as common in the survey area as small delphinoid species and at no point has the amount of take authorized been exceeded or even approached so as to cause concern that the amount would be met or exceeded. As presented in the proposed IHA notice (83 FR 22443, May 15, 2018), where warranted, estimated take calculations were adjusted based on average

group size and sightings from the survey area and are not solely based on calculations based on density data.

Comment 13: Regarding mitigation measures, the NGOs recommended NMFS impose a restriction on site assessment and characterization activities that have the potential to harass the North Atlantic right whale from November 1st to May 14th.

NMFS Response: In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, we carefully consider two primary factors: (1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat; and (2) the practicability of the measures for applicant implementation, which may consider such things as relative cost and impact on operations.

No take of North Atlantic right whales is anticipated, nor are any takes authorized. In addition, although the IHA covers Bay State Wind's activities should they occur at any point during the year, as stated in the notice for the proposed IHA (83 FR 83 FR 22443, May 15, 2018), Bay State Wind's activities are anticipated to begin as soon as they receive their authorization and last for approximately 60 days (60 days for the offshore sections and 40 days for the inshore sections that may occur concurrently). In addition, again although the analysis covers activities conducted in any months, Bay State Wind's HRG survey activities are anticipated to be complete prior to the recommended restriction (November 1 – May 14).

Bay State Wind determined the planned duration of the survey based on their data acquisition needs, which are largely driven by the BOEM's data acquisition requirements prior to required submission of a construction and operations plan (COP). Any effort on the part of

NMFS to restrict the months during which the survey could operate could have the effect of forcing the applicant to conduct additional months of surveys the following year, resulting in increased costs incurred by the applicant and extending the amount of time need to complete the surveys with associated additional production of underwater noise which could have further potential impacts to marine mammals. Thus, the time and area restrictions recommended by the commenters would not be practicable for the applicant to implement and would to some degree offset the benefit of the recommended measure. In addition, our analysis of the potential impacts of the survey on right whales does not indicate that such closures are warranted, as there are no takes of North Atlantic right whales anticipated or authorized and no marine mammal injury is expected as a result of the survey, nor is injury authorized in the IHA. Thus, in consideration of the limited potential benefits of time and area restrictions, in concert with the impracticability and increased cost on the part of the applicant that would result from such restrictions, NMFS has determined that time and area restrictions are not warranted in this case. Existing mitigation measures, including exclusion zones, ramp-up of survey equipment, and vessel strike avoidance measures, are sufficiently protective to ensure the least practicable adverse impact on species or stocks and their habitat.

Comment 14: Regarding mitigation measures, the NGOs recommended that NMFS require that geophysical surveys commence, with ramp-up, during daylight hours only to maximize the probability that North Atlantic right whales are detected and confirmed clear of the exclusion zone, and that, if a right whale were detected in the exclusion zone during nighttime hours and the survey is shut down, developers should be required to wait until daylight hours for ramp-up to commence.

NMFS Response: We acknowledge the limitations inherent in detection of marine mammals at night. However, as described above, no takes of North Atlantic right whales have been authorized and potential impacts to other marine mammals from the survey activities would be limited to short-term behavioral responses. Restricting surveys in the manner suggested by the commenters may reduce marine mammal exposures by some degree in the short term, but would not result in any significant reduction in either intensity or duration of noise exposure. No injury is expected to result even in the absence of mitigation, given the very small estimated Level A harassment zones. In the event that NMFS imposed the restriction suggested by the commenters, potentially resulting in a second season of surveys required for the applicant, vessels would be on the water introducing noise into the marine environment for an extended period of time. Therefore, in addition to practicability concerns for the applicant, the restrictions recommended by the commenters could result in the surveys spending increased time on the water, which may result in greater overall exposure to sound for marine mammals; thus the commenters have failed to demonstrate that such a requirement would result in a net benefit for affected marine mammals. Further, we note that past monitoring reports indicate the ability to detect marine mammals at night, including smaller cetaceans, with use of the infrared and night vision technologies in combination with passive acoustic monitoring (PAM) employed during nighttime activities. Therefore, in consideration of potential effectiveness of the recommended measure and its practicability for the applicant, NMFS has determined that restricting survey start-ups to daylight hours is not warranted in this case.

We note that the proposed IHA *Federal Register* notice included a mitigation requirement that shutdown of geophysical survey equipment would be required upon confirmed PAM detection of a North Atlantic right whale at night, even in the absence of visual

confirmation, except in cases where the acoustic detection can be localized and the right whale can be confirmed as being beyond the 500 meter (m) exclusion zone (EZ); equipment may be re-started no sooner than 30 minutes after the last confirmed acoustic detection. This mitigation measure was retained and has been included as part of the issued IHA.

Comment 15: The NGOs recommended that NMFS require a 500 m EZ for marine mammals (with the exception of dolphins that voluntarily approach the vessel). Additionally, the NGOs recommended that protected species observers (PSO) monitor to an extended 1,000 m EZ for North Atlantic right whales, and stated that NMFS has been inconsistent in its EZ requirements for different lease areas without explanation or justification.

NMFS Response: NMFS' mitigation measures, including establishment of EZs, are based on consideration of a variety of factors including consideration of two primary factors: 1) the manner in which, and the degree to which, the successful implementation of the measure(s) would be expected to reduce impacts (which considers the nature of the potential adverse impact being mitigated and likelihood that the measure will be effective if implemented along with the likelihood of effective implementation), and 2) the practicability of the measure for the applicant (which may consider such things as cost and impact on operations among other things for activities not applicable to this authorization). These considerations may at times result in different outcomes and requirements between differing areas. Regarding the specific recommendation for a 1,000 m EZ specifically for North Atlantic right whales, we have determined that the 500 m EZ, as required in the IHA, is sufficiently protective. We note that the 500 m EZ exceeds the modeled distance to the conservatively modeled Level B harassment isopleth (400 m), thus for North Atlantic right whales detected by PSOs this EZ would effectively minimize potential instances of injury and harassment.

Regarding the commenters' recommendation to require a 500 m EZ for all marine mammals (except dolphins that approach the vessel) we have determined the EZs as currently required in the IHA (described in Mitigation Measures, below) are sufficient to ensure the least practicable adverse impact on species or stocks and their habitat. The EZs would prevent all potential instances of marine mammal injury. In this instance, injury would not be an expected outcome even in the absence of mitigation due to very small predicted isopleths corresponding to the Level A harassment threshold (Note that the 75 m Level A harassment threshold for harbor porpoises as discussed in the proposed IHA was based on the more conservative impulsive threshold and has since been updated with the correct non-impulsive threshold, which means the isopleth is actually < 5 m, as opposed to the previously considered 75 m) and would further prevent some instances of behavioral harassment, as well as limiting the intensity and/or duration of behavioral harassment that does occur. As NMFS has determined the EZs currently required in the IHA to be sufficiently protective, we do not think expanded EZs, beyond what is required in the IHA are warranted.

Comment 16: The NGOs recommended that a combination of visual monitoring by PSOs and PAM should be required 24 hours per day.

NMFS Response: As stated in the notice for the proposed IHA (83 FR 22443, May 15, 2018) and below in the Mitigation section, when evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on marine mammals species or stocks and their habitats, as well as subsistence uses where applicable, NMFS considers two primary factors: 1) the manner in which, and the degree to which, the successful implementation of the measure(s) would be expected to reduce impacts (which considers the nature of the potential adverse impact being mitigated and likelihood that the measure will be effective if implemented

along with the likelihood of effective implementation), and 2) the practicability of the measure for the applicant (which may consider such things as cost and impact on operations among other things for activities not applicable to this authorization). The PAM requirement has been included in the IHA because PAM was proposed by the applicant, and PAM is required in BOEM lease stipulations. We do not think the use of PAM is necessarily warranted for surveys using the sound sources proposed for use by the applicant, due to relatively small areas that are expected to be ensonified to the Level A harassment threshold making it unlikely that injury or more serious effects would result from the activities. As such, this is an example of a mitigation measure that NMFS would not require, but is implementing due to consideration of other factors. As we are not convinced that PAM is necessarily warranted for this type of survey, we do not think a requirement to expand the use of PAM to 24 hours a day during the survey is warranted. Expanding the PAM requirement to 24 hours a day may also result in increased costs on the part of the applicant. When the potential benefits of a 24 hour PAM requirement are considered in concert with the potential increased costs on the part of the applicant that would result from such a requirement, we determined a requirement for 24 hour PAM operation is not warranted in this case. Given the lower level of effects to marine mammals from the types of surveys authorized in this IHA are expected to be limited to behavioral harassment even in the absence of mitigation, we have determined the current requirements for visual and acoustic monitoring are sufficient to ensure the EZs and Watch Zone are adequately monitored for this particular activity.

Comment 17: The NGOs recommended that NMFS require a 10 knot speed restriction on all project-related vessels transiting to/from the survey area from February 1 to May 14, and that all project vessels operating within the survey area should be required to maintain a speed of 10 knots or less during the entire survey period. It was also noted that vessels less than 65 ft. in

length are exempt from NMFS' regulations (presumably this is in reference to mandatory speed restrictions of 10 knots or less, in effect for the following seasonal management areas (SMA): Cape Cod Bay from January 1 through May 15 and/or Block Island from November 1 through April 30 and/or the voluntary speeds in the voluntary DMAs, which includes the area south of Nantucket July 2, 2018 through July 15, 2018. We note here that the survey area is not within any of these areas, but that DMAs may be developed and Bay State Wind will be required to monitor for the creation of DMAs and abide by the requirements of any DMA created) and that the proposed IHA provided no speed restrictions for the Autonomous Surface Vessels (ASV) or other support vessels that may be operating during the survey months.

NMFS Response: NMFS has analyzed the potential for ship strike resulting from Bay State Wind's activity and has determined that the mitigation measures specific to ship strike avoidance are sufficient to minimize the potential for ship strike such that we have determined this is discountable. These measures include: a requirement that all vessel operators comply with 10 knot (18.5 kilometer (km)/hour) or less speed restrictions in any SMA or Dynamic Management Area (DMA); a requirement that all vessel operators reduce vessel speed to 10 knots (18.5 km/hour) or less when any large whale, any mother/calf pairs, pods, or large assemblages of non-delphinoid cetaceans are observed within 100 m of an underway vessel; a requirement that all survey vessels maintain a separation distance of 500 m or greater from any sighted North Atlantic right whale; a requirement that, if underway, vessels must steer a course away from any sighted North Atlantic right whale at 10 knots or less until the 500 m minimum separation distance has been established; and a requirement that, if a North Atlantic right whale is sighted in a vessel's path, or within 500 m of an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. Additional measures to prevent the potential for ship

strike are discussed in more detail below (see the Mitigation section). We have determined that the ship strike avoidance measures are sufficient to ensure the least practicable adverse impact on species or stocks and their habitat. We also note that vessel strike during surveys is extremely unlikely based on the low vessel speed; the survey vessel would maintain a speed of approximately 4 knots (7.4 km/hour) while transiting survey lines. The stated speed restrictions would apply to all vessels including the ASVs and support vessels. Further, given that the ASVs must be within a maximum of 800 m from the mother ship, the speed of the ASV vessels could not exceed that of the mother vessel.

Comment 18: The NGOs recommended that NMFS analyses account for the potential for indirect ship strike risk resulting from habitat displacement.

NMFS Response: NMFS determined that habitat displacement was not an expected outcome of the specified activity. As discussed in the notice for the proposed IHA (83 FR 22443, May 15, 2018) we anticipate marine mammals may avoid the area of disturbing noise, but this would be a relatively small area, as the Level B harassment zone was conservatively estimated to be 400 m, and would be short-term in nature such that habitat displacement is not anticipated. As discussed above, since publication of the proposed IHA notice, NMFS has received a sound source verification study from Bay State Wind for the Triple Plate Boomer and based on preliminary review, the actual Level B harassment isopleth would be no more than 100 m, as compared to the 400-m modelled zone, so the area of disturbance would be significantly less than originally reported. Therefore, habitat displacement is not reasonably likely to occur and an analysis of potential impacts to marine mammals from habitat displacement is not warranted in this case.

Comment 19: The NGOs stated that NMFS should not adjust take numbers for North Atlantic right whales based on mitigation measures and stated that they do not share NMFS' level of confidence that it is possible to mitigate all potential for Level B harassment. This lack of confidence is based on 1) an assertion that the 160 dB threshold for behavioral harassment is not supported by best available science (citing to footnote 11 of the comment letter), and 2) an assertion that the monitoring protocols prescribed for the EZs are under-protective (referring to Section III.D of the comment letter for further discussion).

NMFS Response: Regarding the comment addressing the appropriateness of the 160-db behavioral harassment threshold, NMFS assumes that the reference to footnote 11 (Kraus, et al., 2016) in the comment is in error, and the correct reference was meant to be footnote 16, which references Nowacek *et al.*, 2004 and Kastelein *et al.*, 2012 and 2015 as sources for the assertion that take would occur with near certainty at exposure levels well below the 160 dB threshold for behavioral harassment. Regardless, NMFS notes that the potential for behavioral response to an anthropogenic source is highly variable and context-specific and acknowledges the potential for Level B harassment at exposures to received levels below 160 dB rms. Alternatively, NMFS acknowledges the potential that animals exposed to received levels above 160 dB rms will not respond in ways constituting behavioral harassment. There are a variety of studies indicating that contextual variables play a very important role in response to anthropogenic noise, and the severity of effects are not necessarily linear when compared to a received level (RL). The studies cited in the comment (Nowacek *et al.*, 2004 and Kastelein *et al.*, 2012 and 2015) showed there were behavioral responses to sources below the 160 dB threshold, but also acknowledge the importance of context in these responses. For example, Nowacek *et al.*, 2004 reported the behavior of five out of six North Atlantic right whales was disrupted at RLs of only 133 – 148

dB re 1 μ Pa (returning to normal behavior within minutes) when exposed to an alert signal. However, the authors also reported that none of the whales responded to noise from transiting vessels or playbacks of ship noise even though the RLs were at least as strong, and contained similar frequencies, to those of the alert signal. The authors state that a possible explanation for whales responded to the alert signal and did not respond to vessel noise is due to the whales having been habituated to vessel noise, while the alert signal was a novel sound. In addition, the authors noted differences between the characteristics of the vessel noise and alert signal which may also have played a part in the differences in responses to the two noise types. Therefore, it was concluded that the signal itself, as opposed to the RL, was responsible for the response. DeRuiter *et al.* (2012) also indicate that variability of responses to acoustic stimuli depends not only on the species receiving the sound and the sound source, but also on the social, behavioral, or environmental contexts of exposure. Finally, Gong *et al.* (2014) highlighted that behavioral responses depend on many contextual factors, including range to source, RL above background noise, novelty of the signal, and differences in behavioral state. Similarly, Kastelein *et al.*, 2015 (cited in the comment) examined behavioral responses of a harbor porpoise to sonar signals in a quiet pool, but stated behavioral responses of harbor porpoises at sea would vary with context such as social situation, sound propagation, and background noise levels.

NMFS uses 160 dB (rms) as the exposure level for estimating Level B harassment takes and is currently considered the best available science, while acknowledging that the 160 db rms step-function approach is a simplistic approach. However, there appears to be a misconception regarding the concept of the 160 dB threshold. While it is correct that in practice it works as a step-function, *i.e.*, animals exposed to received levels above the threshold are considered to be “taken” and those exposed to levels below the threshold are not, it is in fact intended as a sort of

mid-point of likely behavioral responses (which are extremely complex depending on many factors including species, noise source, individual experience, and behavioral context). What this means is that, conceptually, the function recognizes that some animals exposed to levels below the threshold will in fact react in ways that are appropriately considered take, while others that are exposed to levels above the threshold will not. Use of the 160-dB threshold allows for a simplistic quantitative estimate of take, while we can qualitatively address the variation in responses across different received levels in our discussion and analysis.

Overall, we reiterate the lack of scientific consensus regarding what might criteria might be more appropriate. Defining sound levels that disrupt behavioral patterns is difficult because responses depend on the context in which the animal receives the sound, including an animal's behavioral mode when it hears sounds (*e.g.*, feeding, resting, or migrating), prior experience, and biological factors (*e.g.*, age and sex). Other contextual factors, such as signal characteristics, distance from the source, and signal to noise ratio, may also help determine response to a given received level of sound. Therefore, levels at which responses occur are not necessarily consistent and can be difficult to predict (Southall *et al.*, 2007; Ellison *et al.*, 2012; Bain and Williams, 2006).

There is currently no agreement on these complex issues, and NMFS followed the practice at the time of submission and review of this application in assessing the likelihood of disruption of behavioral patterns by using the 160 dB threshold. This threshold has remained in use in part because of the practical need to use a relatively simple threshold based on available information that is both predictable and measurable for most activities. We note that the seminal review presented by Southall *et al.* (2007) did not suggest any specific new criteria due to lack of convergence in the data. NMFS is currently evaluating available information towards

development of guidance for assessing the effects of anthropogenic sound on marine mammal behavior. However, undertaking a process to derive defensible exposure-response relationships is complex (*e.g.*, NMFS previously attempted such an approach, but is currently re-evaluating the approach based on input collected during peer review of NMFS (2016)). A recent systematic review by Gomez *et al.* (2016) was unable to derive criteria expressing these types of exposure-response relationships based on currently available data.

NMFS acknowledges that there may be methods of assessing likely behavioral response to acoustic stimuli that better capture the variation and context-dependency of those responses than the simple 160 dB step-function used here, there is no agreement on what that method should be or how more complicated methods may be implemented by applicants. NMFS is committed to continuing its work in developing updated guidance with regard to acoustic thresholds, but pending additional consideration and process is reliant upon an established threshold that is reasonably reflective of available science.

Regarding the assertion that that monitoring protocols prescribed for the EZs are under-protective, the comment refers to Section III.D of the comment letter for further discussion. The responses to Comments 13 - 18 addresses the recommendation for additional mitigation measures in Section III.D of the comment letter. Please refer to these responses for NMFS' reasoning for why these additional measures are not warranted and why NMFS has determined that the monitoring protocols prescribes are sufficiently protective of marine mammals. Specifically, the required 500-m shutdown for North Atlantic right whales is adequate to effectively ensure that no takes occur for this species, given the large size (visibility) of the animals, the visual and PAM monitoring, and results of past reports regarding right whales in the area (please also refer to the Estimated Take section of this notice).

Further, since publication of the notice of the proposed IHA (83 FR 22443, May 15, 2018), NMFS received a sound source verification (SSV) study for the sound source with the largest Level B harassment isopleth (Applied Acoustics S-Boom Triple Plate Boomer). The Level B harassment isopleth was modelled to be 400 m, which was presented in the proposed IHA. Preliminary analysis of the new SSV study indicates that the actual Level B harassment isopleth for this source is no larger than 100 m (and may be significantly smaller), which means that the associated area ensonified above the Level B harassment zone is at least 94% smaller as compared to that associated with the 400-m isopleth and discussed in the proposed notice. This new information further strengthens the NMFS' determination that the required 500-m shut down for North Atlantic right whales will successfully avoid take of this species.

Comment 20: The NGOs recommended that NMFS encourage offshore wind developers to partner with scientists to collect data that would increase the understanding of the effectiveness of night vision and infra-red technologies off Rhode Island, Massachusetts, and the broader region, with a view towards greater reliance on these technologies to commence surveys during nighttime hours in the future.

NMFS Response: NMFS agrees with the NGOs that improved data on relative effectiveness of night vision and infra-red technologies would be beneficial and could help to inform future efforts at detection of marine mammals during nighttime activities. The commenters have not provided us with any specific recommendations to evaluate beyond a broad recommendation. However, we agree that coordination and communication between offshore wind developers and researchers on effectiveness of night vision and infra-red technologies should be encouraged to the extent possible. NMFS also notes that a requirement for the final

report submitted to NMFS to include an assessment of the effectiveness of night vision equipment used during nighttime surveys, including comparisons of relative effectiveness among the different types of night vision equipment used, is included in the IHA. The IHA issued in 2016 (81 FR 56589, August 22, 2016) also included this requirement, so information gained from this IHA furthers this commitment.

Description of Marine Mammals in the Area of the Specified Activity

Sections 3 and 4 of Bay State Wind's IHA application summarize available information regarding the status and trends, distribution and habitat preferences, and behavior and life history of the potentially affected species. Additional information regarding population trends and threats may be found in NMFS's Stock Assessment Reports (SAR; <http://www.nmfs.noaa.gov/pr/sars/species.htm>) and more general information about these species (e.g., physical and behavioral descriptions) may be found on NMFS' website (<http://www.nmfs.noaa.gov/pr/species/mammals/>).

Table 1 lists all marine mammal species with expected occurrence in the Northwest Atlantic Outer Continental Shelf (OCS) and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) as well as potential biological removal (PBR), where known. For taxonomy, we follow the Committee on Taxonomy (2016). PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS' SARs). While no mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS' stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprise that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS' U.S. Atlantic Ocean SARs (*e.g.*, Hayes *et al.*, 2017). All values presented in Table 1 are the most recent available at the time of publication and are available in the 2016 SARs (Hayes *et al.*, 2017) and draft 2017 SARs (available online at: <http://www.nmfs.noaa.gov/pr/sars/draft.htm>).

Table 1. Marine mammals known to occur in the waters of Southern New England.

Common Name	Scientific Name	ESA/MMPA Status ¹	Stock Abundance (CV; N _{min}) ²	Stock	PBR	Annual M/SI3
Toothed Whales (Odontoceti)						
<i>Atlantic white-sided dolphin</i>	<i>Lagenorhynchus acutus</i>	N/A	48,819 (0.61; 30,403)	W. North Atlantic	304	74
<i>Atlantic spotted dolphin</i>	<i>Stenella frontalis</i>	N/A	44,715 (0.43; 31,610)	W. North Atlantic	316	0
<i>Bottlenose dolphin</i>	<i>Tursiops truncatus</i>	Northern coastal stock is Strategic	11,548 (0.36; 8,620)	W. North Atlantic, Northern Migratory Coastal	86	1 – 7.5
Clymene dolphin	<i>Stenella clymene</i>	N/A	Unknown	W. North Atlantic	Unknown	0
Fraser's dolphin	<i>Lagenodelphis hosei</i>	N/A	Unknown	W. North Atlantic	Unknown	0
Pan-tropical spotted dolphin	<i>Stenella attenuata</i>	N/A	3,333 (0.91; 1,733)	W. North Atlantic	17	0
<i>Risso's dolphin</i>	<i>Grampus griseus</i>	N/A	18,250 (0.46; 12,619)	W. North Atlantic	126	53.6
Rough-toothed dolphin	<i>Steno bredanensis</i>	N/A	271 (1.0; 134)	W. North Atlantic	1.3	0
<i>Short-beaked common dolphin</i>	<i>Delphinus delphis</i>	N/A	70,184 (0.28; 55,690)	W. North Atlantic	557	409
Striped dolphin	<i>Stenella coeruleoalba</i>	N/A	54,807 (0.3; 42,804)	W. North Atlantic	428	0

Spinner dolphin	<i>Stenella longirostris</i>	N/A	Unknown	W. North Atlantic	Unknown	0
White-beaked dolphin	<i>Lagenorhynchus albirostris</i>	N/A	2,003 (0.94; 1,023)	W. North Atlantic	10	0
Harbor porpoise	<i>Phocoena phocoena</i>	N/A	79,833 (0.32; 61,415)	Gulf of Maine/Bay of Fundy	706	437
Killer whale	<i>Orcinus orca</i>	N/A	Unknown	W. North Atlantic	Unknown	0
Pygmy killer whale	<i>Feresa attenuata</i>	N/A	Unknown	W. North Atlantic	Unknown	0
False killer whale	<i>Pseudorca crassidens</i>	Strategic	442 (1.06; 212)	W. North Atlantic	2.1	Unknown
Long-finned pilot whale	<i>Globicephala melas</i>	N/A	5,636 (0.63; 3,464)	W. North Atlantic	35	38
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	N/A	21,515 (0.37; 15,913)	W. North Atlantic	159	192
Sperm whale	<i>Physeter macrocephalus</i>	Endangered	2,288 (0.28; 1,815)	North Atlantic	3.6	0.8
Pigmy sperm whale	<i>Kogia breviceps</i>	N/A	3,785 ⁴ (0.47; 2,598)	W. North Atlantic	21	3.5
Dwarf sperm whale	<i>Kogia sima</i>	N/A	3,785 ⁴ (0.47; 2,598)	W. North Atlantic	21	3.5
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	N/A	6,532 (0.32; 5,021)	W. North Atlantic	50	0.4
Blainville's beaked whale	<i>Mesoplodon densirostris</i>	N/A	7,092 ⁵ (0.54; 4,632)	W. North Atlantic	46	0.2
Gervais' beaked whale	<i>Mesoplodon europaeus</i>	N/A	7,092 ⁵ (0.54; 4,632)	W. North Atlantic	46	0
True's beaked whale	<i>Mesoplodon mirus</i>	N/A	7,092 ⁵ (0.54; 4,632)	W. North Atlantic	46	0
Sowerby's beaked whale	<i>Mesoplodon bidens</i>	N/A	7,092 ⁵ (0.54; 4,632)	W. North Atlantic	46	0
Northern bottlenose whale	<i>Hyperoodon ampullatus</i>	N/A	Unknown	W. North Atlantic	Unknown	0
Melon-headed whale	<i>Peponocephala electra</i>	N/A	Unknown	W. North Atlantic	Unknown	0
Baleen Whales (Mysticeti)						
Minke whale	<i>Balaenoptera acutorostrata</i>	N/A	2,591 (0.81; 1,425)	Canadian East Coast	14	8.25
Blue whale	<i>Balaenoptera musculus</i>	Endangered	Unknown (Unknown; 440)	W. North Atlantic	0.9	Unknown
Fin whale	<i>Balaenoptera physalus</i>	Endangered	1,618 (0.33; 1,234)	W. North Atlantic	2.5	3.8
Humpback whale	<i>Megaptera novaeangliae</i>	N/A	823 (0; 823)	Gulf of Maine	13	9.05
North Atlantic right whale	<i>Eubalaena glacialis</i>	Endangered	440 (0; 440)	W. North Atlantic	1	5.66

Sei whale	<i>Balaenoptera borealis</i>	Endangered	357 (0.52; 236)	Nova Scotia	0.5	0.8
Earless Seals (Phocidae)						
<i>Gray seals</i>	<i>Halichoerus grypus</i>	N/A	424,300 (0.16; 371,444)	<i>W. North Atlantic</i>	<i>Unknown</i>	4,937
<i>Harbor seals</i>	<i>Phoca vitulina</i>	N/A	75,834 (0.15; 66,884)	<i>W. North Atlantic</i>	2,006	389
Hooded seals	<i>Cystophora cristata</i>	N/A	Unknown	W. North Atlantic	Unknown	Unknown
Harp seal	<i>Phoca groenlandica</i>	N/A	8,300,000 (Unknown)	W. North Atlantic	Unknown	Unknown
<p>NOTE: Species information in bold italics are species expected to be taken and are authorized for take in our IHA; others are not expected or authorized to be taken.</p> <p>¹ A strategic stock is defined as any marine mammal stock: 1) for which the level of direct human-caused mortality exceeds the potential biological removal (PBR) level; 2) which is declining and likely to be listed as threatened under the Endangered Species Act (ESA); or 3) which is listed as threatened or endangered under the ESA or as depleted under the Marine Mammal Protection Act (MMPA)</p> <p>² NMFS stock assessment reports online at: www.nmfs.noaa.gov/pr/sars. CV = coefficient of variation; Nmin = minimum estimate of stock abundance.</p> <p>³ These values, found in NMFS' SARs, represent annual levels of human-caused mortality plus serious injury (M/SI) from all sources combined (e.g., commercial fisheries, ship strike, etc.). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.</p> <p>⁴ This estimate may include both the dwarf and pygmy sperm whales.</p> <p>⁵ This estimate includes Gervais' and Blainville's beaked whales and undifferentiated <i>Mesoplodon</i> spp. beaked whales.</p> <p>Sources: Hayes <i>et al.</i>, 2016; Waring <i>et al.</i>, 2015; Waring <i>et al.</i>, 2013; Waring <i>et al.</i>, 2011; Warring <i>et al.</i>, 2010; RI SAMP, 2011; Kenney and Vigness-Raposa, 2009; NMFS, 2012</p>						

All species that could potentially occur in the survey area are included in Table 1.

However, the proposed IHA (83 FR 22443, May 15, 2018) noted that the temporal and/or spatial occurrence of all but 10 species listed in Table 1 is such that take of these species is not expected to occur, and they were not discussed further. Take of the remaining species was not anticipated either because they have very low densities in the project area, are known to occur further offshore than the project area, or are considered very unlikely to occur in the project area during the survey due to the species' seasonal occurrence in the area. However, based on review of public comments received and consideration of updated sighting information, takes of Risso's dolphins, Atlantic spotted dolphins, and long-finned pilot whales have been added even though

they were not included in the proposed IHA. This brings the total to 13 species/stocks of marine mammals authorized for incidental take in this IHA.

A detailed description of the species likely to be affected by Bay State Wind's survey, including brief introductions to the species and relevant stocks as well as available information regarding population trends and threats, and information regarding local occurrence, were provided in the *Federal Register* notice for the proposed IHA (83 FR 22443; May 15, 2018); since that time, we are not aware of any changes in the status of these species and stocks; therefore, detailed descriptions are not repeated here. As Risso's dolphins, Atlantic spotted dolphins, and long-finned pilot whales were not included in the proposed IHA, descriptions of these species are included below. Please refer to the *Federal Register* notice for the proposed IHA for descriptions of other species. Please also refer to NMFS' web site (www.fisheries.noaa.gov/species-directory) for generalized species accounts.

Risso's Dolphin

Risso's dolphin is typically an offshore dolphin that is uncommon to see inshore (Reeves *et al.*, 2002). Risso's dolphin prefers temperate to tropical waters along the continental shelf edge and can range from Cape Hatteras to Georges Bank from spring through fall, and throughout the mid-Atlantic Bight out to oceanic waters during winter (Payne *et al.*, 1984). Risso's dolphins are usually seen in groups of 12 to 40, but loose aggregations of 100 to 200 or more are seen occasionally (Reeves *et al.*, 2002).

Atlantic Spotted Dolphin

Atlantic spotted dolphins are found in tropical and warm temperate waters ranging from southern New England, south to Gulf of Mexico and the Caribbean to Venezuela (Waring *et al.*, 2014). This stock regularly occurs in continental shelf waters south of Cape Hatteras and in

continental shelf edge and continental slope waters north of this region (Waring *et al.*, 2014).

There are two forms of this species, with the larger ecotype inhabiting the continental shelf and usually found inside or near the 200 m isobaths (Waring *et al.*, 2014). Atlantic spotted dolphins are not listed under the ESA and the stock is not considered depleted or strategic under the MMPA.

Long-finned Pilot Whale

Long-finned pilot whales are found from North Carolina and north to Iceland, Greenland and the Barents Sea (Waring *et al.*, 2016). In U.S. Atlantic waters the species is distributed principally along the continental shelf edge off the northeastern U.S. coast in winter and early spring and in late spring, pilot whales move onto Georges Bank and into the Gulf of Maine and more northern waters and remain in these areas through late autumn (Waring *et al.*, 2016). Long-finned pilot whales are not listed under the ESA. The Western North Atlantic stock is considered strategic under the MMPA.

Information concerning marine mammal hearing, including marine mammal functional hearing groups, was provided in the *Federal Register* notice for the proposed IHA (83 FR 22443; May 15, 2018), and that information is not repeated here; please refer to that *Federal Register* notice for this information. For further information about marine mammal functional hearing groups and associated frequency ranges, please see NMFS (2016) for a review of available information. Fourteen marine mammal species (twelve cetacean and two pinniped (both phocid) species) have the potential to co-occur with the survey activities. Of the cetacean species that may be present, four are classified as low-frequency cetaceans (*i.e.*, North Atlantic right whale, humpback whale, fin whale, and minke whale), six are classified as mid-frequency cetaceans (*i.e.*, sperm whale, bottlenose dolphin, common dolphin, Atlantic white sided dolphin,

Risso's dolphin, and long-finned pilot whale), and one is classified as a high-frequency cetacean (*i.e.*, harbor porpoise).

Potential Effects of the Specified Activity on Marine Mammals and Their Habitat

The effects of underwater noise from Bay State Wind's survey activities have the potential to result in take of marine mammals by harassment in the vicinity of the survey area. The *Federal Register* notice for the proposed IHA (83 FR 22443; May 15, 2018) included a discussion of the effects of anthropogenic noise on marine mammals and their habitat, and that information is not repeated here. No instances of serious injury or mortality are expected as a result of the planned activities.

Estimated Take

This section provides an estimate of the number of incidental takes authorized through this IHA, which informed both NMFS' consideration of "small numbers" and the negligible impact determination.

Harassment is the only type of take expected to result from these activities. Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

Authorized takes would be by Level B harassment, as use of the HRG equipment (*i.e.*, USBL&GAPS systems, sub-bottom profilers, sparkers, and boomers) has the potential to result in disruption of behavioral patterns for individual marine mammals. However, the potential for

auditory injury (Level A harassment), primarily for high frequency species (*i.e.*, harbor porpoise) was discussed in the proposed IHA (83 FR 22443, May 15, 2018). While it was noted that auditory injury was unlikely, NMFS proposed to authorize a small number of takes by Level A harassment for harbor porpoises because the applicant requested this out of an abundance of caution. However, after further discussion and consideration of the public comments received, the applicant has withdrawn the request for authorization for Level A harassment takes and none is being authorized in this IHA. Due to the physical properties of the sound sources and the nature of the activities in combination with the hearing capabilities of marine mammals in the Study Area, Level A harassment is so unlikely as to be discountable.

Project activities that have the potential to cause Level B harassment include underwater noise from operation of the HRG survey sub-bottom profilers, boomers, sparkers, and equipment positioning systems. No take by Level A harassment (including injury or serious injury), or mortality is authorized. NMFS does not anticipate take resulting from the movement of vessels associated with construction because there will be a limited number of vessels moving at slow speeds and the BOEM lease agreement requires measures to ensure vessel strike avoidance.

As described below, we estimate take by estimating: 1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; 2) the area or volume of water that will be ensonified above these levels in a day; 3) the density or occurrence of marine mammals within these ensonified areas; and, 4) the number of days of activities. Below we describe these components in more detail and present the take estimate.

Acoustic Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment for non-explosive sources – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.*, frequency, predictability, duty cycle), the environment (*e.g.*, bathymetry), and the receiving animals (hearing, motivation, experience, demography, and behavioral context) and can be difficult to predict (Southall *et al.*, 2007, Ellison *et al.*, 2011). Based on what the available science indicates and the practical need to use a threshold based on a factor that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 μ Pa (rms) for continuous (*e.g.* vibratory pile-driving, drilling) and above 160 dB re 1 μ Pa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources. Bay State Wind's proposed activity includes the use of intermittent impulsive (HRG Equipment) sources, and therefore the 160 dB re 1 μ Pa (rms) threshold is applicable.

Level A harassment for non-explosive sources - NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Technical Guidance, 2016) identifies dual criteria to assess auditory injury (Level A harassment) to five

different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive).

These thresholds are provided in Table 2 below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS 2016 Technical Guidance, which may be accessed at: <http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm>.

Table 2. Thresholds identifying the onset of Permanent Threshold Shift.

Hearing Group	PTS Onset Acoustic Thresholds* (Received Level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	<i>Cell 1</i> $L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	<i>Cell 2</i> $L_{E,LF,24h}$: 199 dB
	<i>Cell 3</i> $L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	<i>Cell 4</i> $L_{E,MF,24h}$: 198 dB
Mid-Frequency (MF) Cetaceans	<i>Cell 5</i> $L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	<i>Cell 6</i> $L_{E,HF,24h}$: 173 dB
	<i>Cell 7</i> $L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	<i>Cell 8</i> $L_{E,PW,24h}$: 201 dB
High-Frequency (HF) Cetaceans	<i>Cell 9</i> $L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	<i>Cell 10</i> $L_{E,OW,24h}$: 219 dB
<p>* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.</p> <p><u>Note:</u> Peak sound pressure (L_{pk}) has a reference value of 1 μPa, and cumulative sound exposure level (L_E) has a reference value of 1 μPa²s. In this Table, thresholds are abbreviated to reflect American National Standards Institute standards (ANSI 2013). However, peak sound pressure is defined by ANSI as incorporating frequency weighting, which is not the intent for this Technical Guidance. Hence, the subscript “flat” is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (<i>i.e.</i>, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.</p>		

Ensonified Area

Here, we describe operational and environmental parameters of the activity that will feed into identifying the area ensonified above the acoustic thresholds.

When NMFS' Acoustic Technical Guidance (2016) was published, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component of the new thresholds, NMFS developed an optional User Spreadsheet that includes tools to help predict takes. We note that because of some of the assumptions included in the methods used for these tools, we anticipate that isopleths produced are typically going to be overestimates of some degree, which will result in some degree of overestimate of Level A harassment takes. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available, and NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For mobile sources such as the HRG survey equipment proposed for use in Bay State Wind's activity, the User Spreadsheet predicts the closest distance at which a stationary animal would not incur PTS if the sound source traveled by the animal in a straight line at a constant speed. Inputs used in the User Spreadsheet, and the resulting isopleths for the various HRG equipment types are reported in Appendix A of Bay State Wind's IHA application, and distances to the acoustic exposure criteria discussed above are shown in Tables 3 and 4.

Table 3. Distances to Thresholds for Level A Harassment (PTS Onset).

Generalized Hearing Group	Marine Mammal Level A Harassment (PTS Onset)	Distance (m)
USBL/GAPS Positioning Systems^{1*}		
LF cetaceans	219 dB _{peak} / 183 dB SEL _{cum}	--- ---
MF cetaceans	230 dB _{peak} / 185 dB SEL _{cum}	--- ---
HF cetaceans	202 dB _{peak} / 155 dB SEL _{cum}	--- ---
Phocid pinnipeds	218 dB _{peak} / 185 dB SEL _{cum}	--- ---
Sub-bottom Profiler¹		

LF cetaceans	219 dB _{peak} / 183 dB SEL _{cum}	--- ---
MF cetaceans	230 dB _{peak} / 185 dB SEL _{cum}	--- ---
HF cetaceans	202 dB _{peak} / 155 dB SEL _{cum}	--- < 6
Phocid pinnipeds	218 dB _{peak} / 185 dB SEL _{cum}	--- ---
Innomar SES-2000 Medium Sub-Bottom Profiler**		
LF cetaceans	199 dB SEL _{cum}	N/A
MF cetaceans	198 dB SEL _{cum}	---
HF cetaceans	173 dB SEL _{cum}	< 5
Phocid pinnipeds	201 dB SEL _{cum}	N/A
Sparker¹		
LF cetaceans	219 dB _{peak} / 183 dB SEL _{cum}	--- ---
MF cetaceans	230 dB _{peak} / 185 dB SEL _{cum}	--- ---
HF cetaceans	202 dB _{peak} / 155 dB SEL _{cum}	< 3 ---
Phocid pinnipeds	218 dB _{peak} / 185 dB SEL _{cum}	--- ---
Boomer		
LF cetaceans	219 dB _{peak} / 183 dB SEL _{cum}	< 2 <15
MF cetaceans	230 dB _{peak} / 185 dB SEL _{cum}	--- ---
HF cetaceans	202 dB _{peak} / 155 dB SEL _{cum}	< 10 <1
Phocid pinnipeds	218 dB _{peak} / 185 dB SEL _{cum}	< 2 <1
<p>Notes:</p> <p>Peak SPL criterion is unweighted, whereas the cumulative SEL criterion is M-weighted for the given marine mammal hearing group;</p> <p>Calculated sound levels and results are based on NMFS Acoustic Technical Guidance companion User Spreadsheet except as indicated (refer to Appendix A of the IHA application, which includes all spreadsheets);</p> <p>¹ Indicates distances for this equipment type have been field verified;</p> <p>--- Indicates not expected</p> <p>* Indicates that while calculated with the incorrect threshold (impulsive instead of non-impulsive), due to the fact that impulsive threshold would be larger and still not anticipated to be measureable, this was not recalculated here.</p> <p>** Indicates a change from the proposed IHA. In proposed IHA, these distances were calculated with the impulsive threshold, which resulted in larger isopleths. The values presented here are calculated with corrected, non-impulsive, threshold.</p>		

Table 4. Distances to Level B Harassment Thresholds (160 dB_{RMS} 90%).

Survey Equipment	Marine Mammal Level B Harassment 160 dB_{RMS} re 1 µPa (m)
USBL & GAPS Positioning Systems	
Sonardyne Ranger 2 USBL HPT 5/7000	6
Sonardyne Ranger 2 USBL HPT	1

3000	
Easytrak Nexus 2 USBL	2
IxSea GAPS System	1
Sidescan Sonar	
EdgeTech 4200 dual frequency Side Scan Sonar	N/A
Multibeam Sonar	
R2 Sonic 2024 Multibeam Echosounder	N/A
Kongsberg EM2040C Dual Band Head	N/A
Shallow Sub-Bottom Profilers	
Edgetech 3200 XS 216	9
Innomar SES-2000 Sub Bottom Profiler	135 ¹
Sparkers	
GeoMarine Geo-Source 400tip	54
Boomers	
Applied Acoustics S-Boom Triple Plate Boomer	400 ¹
Notes: ¹ These sources modeled with RAM/BELLHOP The Level B harassment criterion is unweighted. N/A indicates the operating frequencies are above all relevant marine mammal hearing thresholds and these systems were not directly assessed in this IHA.	

Bay State Wind completed an underwater noise monitoring program for field verification at the project site prior to commencement of the HRG survey that took place in 2016. One of the main objectives of this program was to determine the apparent sound source levels of HRG activities. Results from field verification studies during previously authorized activities were used where applicable and manufacturer source levels were adjusted to reflect the field verified levels. However, not all equipment proposed for use in the 2018 season was used in the 2016 activities. As no field data currently exists for the Innomar sub-bottom profiler, acoustic modeling was completed using a version of the U.S. Naval Research Laboratory's Range-dependent Acoustic Model (RAM) and BELLHOP Gaussian beam ray-trace propagation model (Porter and Liu 1994). The proposed IHA notice noted that this was done for the Applied Acoustics S-Boom Triple Plate Boomer as well, but since publication of that notice (83 FR

22443, May 15, 2018), NMFS has received a sound source verification study which calculated the Level B harassment isopleth for this source. Preliminary analysis indicates that actual distance to the Level B harassment threshold is no more than 100 m, and could be significantly smaller, which would result in no less than a 94% decrease in the size of the associated area ensonified above the Level B harassment threshold for this source, as compared to the 400-m isopleth. However, because review of the SSV report has not been completed and because the report was not available until after the proposed IHA was noticed to the public, the take estimates have not been modified to reflect this new information, which would result in a significant reduction.

Further, calculations of the ensonified area are conservative due to the directionality of the sound sources. For the various HRG transducers Bay State Wind proposes to use for these activities, the beamwidth varies from 200° (almost omnidirectional) to 1°. The modeled directional sound levels were then used as the input for the acoustic propagation models, which do not take the directionality of the source into account. Therefore, the volume of area affected would be much lower than modeled in cases with narrow beamwidths such as the Innomar SES-2000 sub-bottom profiler, which has a 1° beamwidth.

Marine Mammal Occurrence

In this section we provide the information about the presence, density, or group dynamics of marine mammals that will inform the take calculations.

The data used as the basis for estimating species density (“D”) for the Study Area are derived from data provided by Duke University’s Marine Geospatial Ecology Lab and the Marine Life Data and Analysis Team. This data set is a compilation of the best available marine mammal data (1994-2014) and was prepared in a collaboration between Duke University,

Northeast Regional Planning Body, University of Carolina, the Virginia Aquarium and Marine Science Center, and NOAA (Roberts *et al.*, 2016; MDAT 2016).

Northeast Navy Operations Area (OPAREA) Density Estimates (DoN, 2007) were used in support for estimating take for seals, which represents the only available comprehensive data for seal abundance. Navy Oparea Density Estimates (NODEs) utilized vessel-based and aerial survey data collected by NMFS from 1998-2005 during broad-scale abundance studies. Modeling methodology is detailed in DoN (2007). Therefore, for the purposes of the take calculations, NODEs Density Estimates (DoN, 2007) as reported for the summer and fall seasons were used to estimate harbor seal and gray seal densities.

Take Calculation and Estimation

Here we describe how the information provided above is brought together to produce an initial quantitative take estimate. In order to estimate the number of marine mammals predicted to be exposed to sound levels that would result in harassment, radial distances to predicted isopleths corresponding to harassment thresholds are calculated, as described above. Those distances are then used to calculate the area(s) around the HRG survey equipment predicted to be ensonified to sound levels that exceed harassment thresholds. The area estimated to be ensonified to relevant thresholds in a single day of the survey is then calculated, based on areas predicted to be ensonified around the HRG survey equipment and the estimated trackline distance traveled per day by the survey vessel.

The estimated distance of the daily vessel trackline was determined using the estimated average speed of the vessel and the 24-hour or daylight-only operational period within each of the corresponding survey segments. All noise producing survey equipment are assumed to be operating concurrently and the entire duration of the survey. Using the distance of 400 m (1,312

ft) to the Level B harassment isopleth and the estimated daily vessel track of approximately 177.8 km (110.5 miles) for 24-hour operations and 43 km (26.7 miles) for daylight-only operations, areas of ensonification (zone of influence, or ZOI) were calculated and used as a basis for calculating takes of marine mammals. The ZOI is based on the worst case (since it assumes the equipment with the larger ZOI will be operating all the time), and are presented in Table 5. Take calculations were based on the highest seasonal species density as derived from Duke University density data (Roberts *et al.*, 2016) for cetaceans and seasonal OPAREA density estimates (DoN, 2007) for pinnipeds. The resulting take calculations and number of authorized takes (rounded to the nearest whole number) are presented in Table 6.

Table 5. Survey Segment Distances and Zones of Influence.

Survey Segment	Total Track Line (km)	# Active Survey Days	Estimated Distance/Day (km)	Calculated Level B harassment ZOI (km ²)
Lot 3 (WSG/OSS Location-Offshore)	2,845	60	177.8	142.74
Lot 1 (nearshore)	1,091	18	43.0	34.88
Lot 2 (offshore)	563	15	177.8	142.74
Lot 4 (offshore)	2,253	37	177.8	142.74
Lot 5 (nearshore)	108	5	43.0	34.88

Table 6. Estimated B harassment takes for HRG survey activities.

Species	Lot 3 (WSG/OSS Location-Offshore)		Lot 2 (Somerset Export-Offshore)		Lot 1 (Somerset Export - Nearshore)		Lot 4 (Falmouth Export-Offshore)		Lot 5 (Falmouth Export - Nearshore)		Totals	
	Highest Seasonal Avg. Density ^a (#/100 km ²)	Calc. take	Highest Seasonal Avg. Density ^a (#/100 km ²)	Calc. take	Highest Seasonal Avg. Density ^a (#/100 km ²)	Calc. take	Highest Seasonal Avg. Density ^a (#/100 km ²)	Calc. take	Highest Seasonal Avg. Density ^a (#/100 km ²)	Calc. take	Authorized take	% of population
North Atlantic right	0.96	82.22 (0.00)	1.25	26.76 (0.00)	-	-	0.79	41.72 (0.00)	-	-	0.00 ^b	0.00

whale*												
Humpback whale	0.15	12.44	0.12	2.46	-	-	0.04	2.30	-	-	17	2.07
Fin whale	0.27	23.24	0.19	4.15	-	-	0.07	3.64	-	-	31	1.92
Sei whale	0.02	0.00	0.02	0.38	-	-	0.01	0.00	-	-	0.00	0.00
Sperm whale	0.01	0.71	0.01	0.15	-	-	0.00	0.22	-	-	5 ^c	0.22
Minke whale	0.08	7.00	0.05	1.14	-	-	0.03	1.82	-	-	20 ^d	0.77
Bottlenose dolphin	1.72	147.34	0.46	9.85	-	-	9.00	475.06	-	-	1,000 ^c	8.66
Risso's dolphin ^e	0.00	0.00	0.00	0.00	-	-	0.00	0.00	-	-	30	0.16
Atlantic spotted dolphin ^e	0.02	0.00	0.01	0.29	-	-	0.46	0.00	-	-	50	0.11
Long-finned pilot whale ^e	0.26	0.00	0.13	2.88	-	-	0.01	0.00	-	-	3	0.05
Common dolphin	6.26	535.71	2.74	58.67	-	-	0.46	24.34	-	-	2,000 ^d	2.85
Atlantic white-sided dolphin	1.90	162.75	1.07	22.98	-	-	0.21	10.85	-	-	500 ^c	1.02
Harbor porpoise	6.67	677.69	4.89	124.17	-	-	1.11	69.52	-	-	871	1.09
Harbor seal ^f	9.74	834.41	9.74	208.60	9.74	61.15	9.74	514.55	9.74	16.99	1,636	2.16
Gray seal ^f	14.12	1,209.26	14.12	302.32	14.12	88.65	14.12	745.71	14.12	24.62	2,371	0.56

Notes:

* Calculated takes based on the overly conservative 400 m Level B harassment isopleth originally reported. Since publication of the proposed IHA, a sound source verification has been received, which indicates that the Level B harassment zone would be greatly reduced.

^a Density values from Duke University (Roberts *et al.*, 2016) except for pinnipeds

^b Exclusion zone exceeds Level B harassment isopleth; take adjusted to 0 given mitigation to prevent take

^c Value not based on calculated takes, but estimates from applicant based on recent sightings information

^d Adjusted to account for actual take sighting data in the Survey Area to date (Smultea Environmental Sciences, 2016; Gardline, 2016)

^e The number of authorized takes (Level B harassment only) for these species has been increased from the estimated take to mean group size. Source for long-finned pilot whale group size estimate is: Augusto *et al.* (2017). Source for Atlantic spotted dolphin group size estimate is: Jefferson *et al.* (2008). Source for Risso's dolphin group size estimate is: Baird and Stacey (1991).

^f Density from NODEs (DoN, 2007)

As noted in Table 6, requested take estimates were adjusted to account for typical group size and were also adjusted to account for recent sightings data (Smultea Environmental Sciences, 2016; Gardline, 2016) for certain species. In addition, requested Level A harassment take numbers for harbor porpoise were included in the proposed IHA Federal Register notice (83 FR 22443, May 15, 2018). In that notice, NMFS stated that due to a variety of reasons, Level A

harassment take was not a likely occurrence (short pulse duration and highly directional sound pulse transmission of these mobile sources in addition to the propensity of harbor porpoises to avoid such sound sources and the unlikely probability that they would remain within the narrow beam long enough to accumulate energy to experience PTS), but a small number of Level A harassment take was proposed at the request of Bay State Wind out of an abundance of caution. However, since publication of the proposed IHA, and consideration of public comments received, NMFS has determined that Level A harassment take is so unlikely as to be discountable. Bay State Wind has agreed and withdrew the request for authorization of Level A harassment take. Therefore, no Level A harassment take for harbor porpoises has been authorized. The requested take numbers remain adjusted for north Atlantic right whales due to the implementation of a 500 m shutdown zone, which is greater than the conservatively modeled 400 m Level B behavioral harassment zone, to avoid Level B harassment takes of this species consistent with the Proposed IHA. As discussed previously, preliminary analysis of a sound source verification study of the Triple Plate Boomer indicates that the Level B harassment isopleth is actually no more than 100 m, which further supports our determination that implementation of the 500 m shutdown zone for North Atlantic right whales would successfully avoid any take for this species. Finally, the proposed IHA did not include proposed take of Risso's dolphins, Atlantic spotted dolphins, or long-finned pilot whales. After consideration of public comments received as well as review of monitoring reports and IHAs for other activities in the same general area, NMFS has added authorized Level B harassment takes of these species.

Bay State Wind's calculations do not take into account whether a single animal is harassed multiple times or whether each exposure is a different animal. Therefore, the numbers in Tables 6 are the maximum number of animals that may be harassed during the HRG surveys

(i.e., Bay State Wind assumes that each exposure event is a different animal). With the exception of north Atlantic right whales, these estimates do not account for prescribed mitigation measures that Bay State Wind would implement during the specified activities and the fact that other mitigation measures may be imposed as part of other agreements that Bay State Wind must adhere to, such as their lease agreement with BOEM.

No take of North Atlantic right whale is requested, nor is any take of this species authorized. The conservatively modeled Level B behavioral harassment (400 m) is well within the 500 m mitigation shut down zone for this species and, based on the described monitoring measures, information from previous monitoring reports, and in consideration of the size and visibility of this species, and consideration of a recently-received sound source verification study for the Applied Acoustics S-Boom Triple Plate Boomer (which indicates the Level B harassment zone is substantially less than modelled) it is reasonable to expect that North Atlantic right whales will be able to be observed such that shut down would occur well beyond the threshold for potential behavioral harassment.

There are several reasons why the 400-m Level B harassment threshold is considered conservative. First, calculation of the ensonified area does not take directionality of the sound source into account and this results in a conservative estimate for the ZOI. The Applied Acoustics S-Boom triple plate boomer resulted in the largest isopleth for Level B harassment, so the ZOI was calculated using this 400 m isopleth and, as described above, this equipment has a beamwidth of $25^{\circ} - 35^{\circ}$ (is not omnidirectional) so the actual ensonified volume would be less than the calculated area. Further, the equipment with the largest radial distance to Level B harassment thresholds was used to calculate the ZOI under the assumption that this equipment would be in use for the entirety of the survey activities. The calculated takes are conservative

because these HRG sound sources have very short pulse durations that are also not taken into account in calculations of take, but would lessen the potential for marine mammals to be exposed to the sound source for long enough periods to result in the potential for take as described above. Last, although the information has not been used to modify the ensonified area and inform the take estimates, because it has not been fully reviewed and verified, we note our recent receipt (since the proposed FRN for this IHA was published) of the results of a sound source verification study for the Applied Acoustics S-Boom Triple Plate Boomer, which suggest a notably smaller Level B harassment zone (see the Comment Response section for more detail).

Mitigation

In order to issue an IHA under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (latter not applicable for this action). NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks and their habitat (50 CFR 216.104(a)(11)).

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors:

- 1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks,

and their habitat. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned) and the likelihood of effective implementation (probability implemented as planned); and

2) The practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Bay State Wind must implement the following mitigation measures during site characterization surveys utilizing HRG survey equipment. The mitigation measures outlined in this section are based on protocols and procedures that have been successfully implemented and resulted in no observed take of marine mammals for similar offshore projects and previously approved by NMFS (DONG Energy, 2016, ESS, 2013; Dominion, 2013 and 2014), as well as results of sound source verification (SSV) studies implemented by Bay State Wind during past activities in the proposed project area.

Marine Mammal Exclusion and Monitoring Zones

Protected species observers (PSOs) must monitor the following exclusion/monitoring zones for the presence of marine mammals:

- A 1,640 feet (ft) (500-m) exclusion zone for North Atlantic right whales, which encompasses the largest Level B harassment isopleth of 400 m for the Applied Acoustics S-Boom Triple Plate Boomer;

- A 328-ft (100-m) exclusion zone for non-delphinoid large cetacean and ESA-listed marine mammals, which is consistent with vessel strike avoidance measures stipulated in the BOEM lease; and
- A 1,312-ft (400-m) Level B harassment monitoring zone for all marine mammals except for North Atlantic right whales, which is the extent of the largest Level B harassment isopleth for the Applied Acoustics S-Boom Triple Plate Boomer. We note that the actual area monitored (watch zone) will be much larger than this and must include the largest area visible. All marine mammals observed within the watch zone must be reported in the monitoring reports, but only marine mammals within the Level B harassment zone will be counted as Level B harassment takes in the monitoring reports.

The distances from the sound sources for these exclusion/monitoring zones are based on distances to NMFS Level B harassment threshold or requirements of the BOEM lease stipulations for vessel strike avoidance (discussed below). The representative area ensounded to the MMPA Level B harassment threshold for each of the pieces of HRG survey equipment represents the zone within which take of a marine mammal could occur. The distances to the harassment criteria were used to support the estimate of take as well as the development of the monitoring and/or mitigation measures. Radial distance to NMFS' Level A and Level B harassment thresholds are summarized in Table 5 above.

Visual monitoring of the established exclusion and monitoring zone(s) for the HRG surveys must be performed by qualified and NMFS-approved PSOs. Observer qualifications must include direct field experience on a marine mammal observation vessel and/or aerial surveys in the Atlantic Ocean/Gulf of Mexico. An observer team comprising a minimum of four NMFS-approved PSOs and two certified PAM operators (PAM operators shall not function as

PSOs), operating in shifts, must be stationed aboard either the survey vessel or a dedicated PSO-vessel. PSOs and PAM operators must work in shifts such that no one monitor must work more than 4 consecutive hours without a 2-hour break or longer than 12 hours during any 24-hour period. During daylight hours the PSOs must rotate in shifts of 1 on and 3 off, while during nighttime operations PSOs must work in pairs. The PAM operators must also be on call as necessary during daytime operations should visual observations become impaired. Each PSO must monitor 360 degrees of the field of vision.

PSOs are responsible for visually monitoring and identifying marine mammals approaching or within the established exclusion zone(s) during survey activities. It is the responsibility of the Lead PSO on duty to communicate the presence of marine mammals as well as to communicate and ensure the action(s) that are necessary to ensure mitigation and monitoring requirements are implemented as appropriate. PAM operators must communicate detected vocalizations to the Lead PSO on duty, who is then be responsible for implementing the necessary mitigation procedures. A mitigation and monitoring communications flow diagram has been included as Appendix A in the IHA application.

PSOs must be equipped with binoculars and have the ability to estimate distances to marine mammals located in proximity to the vessel and/or exclusion zone using range finders. Reticulated binoculars must also be available to PSOs for use as appropriate based on conditions and visibility to support the sighting and monitoring of marine species. Digital single-lens reflex camera equipment must be used to record sightings and verify species identification. During night operations, PAM (see *Passive Acoustic Monitoring* requirements below) and night-vision equipment in combination with infrared video monitoring must be used (Additional details and specifications of the night-vision devices and infrared video monitoring technology will be

provided under separate cover by the Bay State Wind Survey Contractor once selected.).

Position data must be recorded using hand-held or vessel global positioning system (GPS) units for each sighting.

For monitoring around the ASV, a dual thermal/high definition (HD) camera must be installed on the mother vessel, facing forward, angled in a direction so as to provide a field of view ahead of the vessel and around the ASV. The ASV must be kept in sight of the mother vessel at all times (within 2,625 ft (800 m)). PSOs must be able to monitor the real time output of the camera on hand-held devices. Images from the cameras must be captured for review and to assist in verifying species identification. A monitor must also be installed on the bridge displaying the real-time picture from the thermal/HD camera installed on the front of the ASV itself, providing a further forward field of view of the craft. In addition, night-vision goggles with thermal clip-ons, as mentioned above, and a hand-held spotlight must be provided such that PSOs can focus observations in any direction, around the mother vessel and/or the ASV. PSOs must also monitor the data as it is acquired by the ASV utilizing a real time IP radio link. For each 12 hour shift, an ASV technician must be assigned to manage the vessel and monitor the array of cameras, radars, and thermal equipment during their shift to ensure the vehicle is operating properly and to take over control of the vessel should the need arise. Additionally, there must be 2 survey technicians per shift assigned to acquire the ASV survey data.

The PSOs must begin observation of the exclusion zone(s) at least 30 minutes prior to ramp-up of HRG survey equipment. Use of noise-producing equipment must not begin until the exclusion zone is clear of all marine mammals for at least 30 minutes.

If a marine mammal is detected approaching or entering the exclusion zones during the HRG survey, the vessel operator must adhere to the shutdown procedures described below to minimize noise impacts on the animals.

At all times, the vessel operator must maintain a separation distance of 500 m from any sighted North Atlantic right whale as stipulated in the *Vessel Strike Avoidance* procedures described below. These stated requirements must be included in the site-specific training to be provided to the survey team.

Vessel Strike Avoidance

The Applicant must ensure that vessel operators and crew maintain a vigilant watch for cetaceans and pinnipeds and slow down or stop their vessels to avoid striking these species. Survey vessel crew members responsible for navigation duties must receive site-specific training on marine mammal and sea turtle sighting/reporting and vessel strike avoidance measures. Vessel strike avoidance measures must include the following, except under extraordinary circumstances, when complying with these requirements would put the safety of the vessel or crew at risk:

- All vessel operators must comply with 10 knot (<18.5 km per hour (km/h)) speed restrictions in any DMA. In addition, all vessels operating from November 1 through July 31 must operate at speeds of 10 knots (<18.5 km/h) or less;
- All vessel operators must reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or larger assemblages of non-delphinoid cetaceans are observed near an underway vessel;
- All survey vessels must maintain a separation distance of 1,640 ft (500 m) or greater from any sighted North Atlantic right whale;

- If underway, vessels must steer a course away from any sighted North Atlantic right whale at 10 knots (<18.5 km/h) or less until the 1,640 ft (500 m) minimum separation distance has been established. If a North Atlantic right whale is sighted in a vessel's path, or within 330 ft (100 m) to an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. Engines shall not be engaged until the North Atlantic right whale has moved outside of the vessel's path and beyond 330 ft (100 m). If stationary, the vessel must not engage engines until the North Atlantic right whale has moved beyond 330 ft (100 m);

- All vessels must maintain a separation distance of 330 ft (100 m) or greater from any sighted non-delphinoid (*i.e.*, mysticetes and sperm whales) cetaceans. If sighted, the vessel underway must reduce speed and shift the engine to neutral, and must not engage the engines until the non-delphinoid cetacean has moved outside of the vessel's path and beyond 330 ft (100 m). If a survey vessel is stationary, the vessel must not engage engines until the non-delphinoid cetacean has moved out of the vessel's path and beyond 330 ft (100 m);

- All underway vessels must avoid excessive speed or abrupt changes in direction to avoid injury to any sighted delphinoid cetacean or pinniped; and

- All vessels must maintain a separation distance of 164 ft (50 m) or greater from any sighted pinniped.

The training program must be provided to NMFS for review and approval prior to the start of surveys. Confirmation of the training and understanding of the requirements must be documented on a training course log sheet. Signing the log sheet certifies that the crew members understand and must comply with the necessary requirements throughout the survey event.

Seasonal Operating Requirements

Between watch shifts, members of the monitoring team shall consult the NMFS North Atlantic right whale reporting systems for the presence of North Atlantic right whales throughout survey operations. However, the proposed survey activities will occur outside of the seasonal management area (SMA) located off the coast of Massachusetts and Rhode Island. The proposed survey activities are also scheduled to occur outside of the seasonal mandatory speed restriction period for this SMA (November 1 through April 30); however, survey vessels will operate at or below the speed restrictions due to the nature of the survey activities.

Throughout all survey operations, the Applicant shall monitor the NMFS North Atlantic right whale reporting systems for the establishment of a DMA. If NMFS should establish a DMA in the Study Area under survey, within 24 hours of the establishment of the DMA the Applicant shall work with NMFS to shut down and/or alter the survey activities to avoid the DMA.

Passive Acoustic Monitoring

As per the BOEM Lease, alternative monitoring technologies (*e.g.*, active or passive acoustic monitoring) are required if a Lessee intends to conduct geophysical surveys at night or when visual observation is otherwise impaired. To support 24-hour HRG survey operations, Bay State Wind shall use certified PAM operators with experience reviewing and identifying recorded marine mammal vocalizations, as part of the project monitoring during nighttime operations to provide for optimal acquisition of species detections at night, or as needed during periods when visual observations may be impaired. In addition, PAM systems shall be employed during daylight hours to support system calibration and PSO and PAM team coordination, as well as in support of efforts to evaluate the effectiveness of the various mitigation techniques (*i.e.*, visual observations during day and night, compared to the PAM detections/operations).

Given the range of species that could occur in the Study Area, the PAM system shall consist of an array of hydrophones with both broadband (sampling mid-range frequencies of 2 kHz to 200 kHz) and at least one low-frequency hydrophone (sampling range frequencies of 10 Hz to 30 kHz). Monitoring of the PAM system shall be conducted from a customized processing station aboard the HRG survey vessel. The on-board processing station provides the interface between the PAM system and the operator. The PAM operator(s) shall monitor the hydrophone signals in real time both aurally (using headphones) and visually (via the monitor screen displays). Bay State Wind proposes the use of PAMGuard software for ‘target motion analysis’ to support localization in relation to the identified exclusion zone. PAMGuard is an open source software/hardware interface to enable flexibility in the configuration of in-sea equipment (number of hydrophones, sensitivities, spacing, and geometry). PAM operators shall immediately communicate detections/vocalizations to the Lead PSO on duty who will ensure the implementation of the appropriate mitigation measure (*e.g.*, shutdown) even if visual observations by PSOs have not been made.

Ramp-Up

As per the BOEM Lease, a ramp-up procedure shall be used for HRG survey equipment capable of adjusting energy levels at the start or re-start of HRG survey activities. A ramp-up procedure shall be used at the beginning of HRG survey activities in order to provide additional protection to marine mammals near the Study Area by allowing them to vacate the area prior to the commencement of survey equipment use. The ramp-up procedure shall not be initiated during daytime, night time, or periods of inclement weather if the exclusion zone cannot be adequately monitored by the PSOs using the appropriate visual technology (*e.g.*, reticulated binoculars, night vision equipment) and/or PAM for a 30-minute period. A ramp-up shall begin

with the power of the smallest acoustic HRG equipment at its lowest practical power output appropriate for the survey. The power shall then be gradually turned up and other acoustic sources added such that the source level would increase in steps not exceeding 6 dB per 5-minute period. If marine mammals are detected within the HRG survey exclusion zone prior to or during the ramp-up, activities shall be delayed until the animal(s) has moved outside the monitoring zone and no marine mammals are detected for a period of 30 minutes.

Shutdown Procedures

The EZ around the HRG survey equipment shall be monitored, as previously described, by PSOs and at night by PAM operators for the presence of marine mammals before, during, and after HRG surveys. The vessel operator must comply immediately with any call for shutdown by the Lead PSO. Any disagreement should be discussed only after shutdown.

As per the BOEM Lease, if a non-delphinoid (*i.e.*, mysticetes and sperm whales) cetacean is detected at or within the established Level A harassment exclusion zone, an immediate shutdown of the HRG survey equipment is required. Subsequent restart of the electromechanical survey equipment must use the ramp-up procedures described above and may only occur following clearance of the exclusion zone for 30 minutes for large cetaceans or 15 minutes for small cetaceans and pinnipeds. Subsequent power up of the survey equipment must use the ramp-up procedures described above and may occur after the exclusion zone is clear of small cetaceans and/or pinniped for 15 minutes and large cetaceans for 30 minutes.

If the HRG sound source (including the sub-bottom profiler) shuts down for reasons other than encroachment into the exclusion zone by a marine mammal including but not limited to a mechanical or electronic failure, resulting in the cessation of sound source for a period greater than 20 minutes, a restart for the HRG survey equipment (including the sub-bottom profiler) is

required using the full ramp-up procedures and clearance of the exclusion zone of all cetaceans for 30 minutes, or 15 minutes for pinnipeds. If the pause is less than 20 minutes, the equipment may be restarted as soon as practicable at its operational level as long as visual surveys were continued diligently throughout the silent period and the exclusion zone remained clear of cetaceans and pinnipeds. If the visual surveys were not continued diligently during the pause of 20 minutes or less, a restart of the HRG survey equipment (including the sub-bottom profiler) is required using the full ramp-up procedures and clearance of the exclusion zone for all cetaceans and pinnipeds for 30 minutes.

The required mitigation measures are designed to avoid the already low potential for injury (Level A harassment) and minimize Level B harassment, as well as to minimize the potential for vessel strikes. There are no known marine mammal rookeries or mating grounds in the survey area that would otherwise potentially warrant increased mitigation measures for marine mammals or their habitat (or both). The proposed survey would occur in an area that has been identified as a biologically important area (BIA) for migration for North Atlantic right whales. However, given the small spatial extent of the survey area relative to the substantially larger spatial extent of the right whale migratory area, the survey is not expected to appreciably reduce migratory habitat nor to negatively impact the migration of North Atlantic right whales. In addition, the timing of importance for migration in this biologically important area BIA is March-April and November-December, and Bay State Wind's proposed activities are anticipated to occur outside of the timing of importance. Thus, mitigation to address the proposed survey's occurrence in North Atlantic right whale migratory habitat is not warranted. The proposed survey area would partially overlap spatially with a biologically important feeding area for fin whales. However, the fin whale feeding area is sufficiently large (2,933 km²), and the acoustic footprint

of the proposed survey is sufficiently small that the survey is not expected to appreciably reduce fin whale feeding habitat nor to negatively impact the feeding of fin whales, thus mitigation to address the proposed survey's occurrence in fin whale feeding habitat is not warranted. Further, we believe the required mitigation measures are practicable for the applicant to implement

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has determined that the mitigation measures provide the means of effecting the least practicable impact on marine mammals species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of:
(1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected

species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas);

- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and
- Mitigation and monitoring effectiveness.

Monitoring Measures

Visual Monitoring - Visual monitoring shall be performed by qualified and NMFS-approved PSOs (see discussion of PSO qualifications and requirements in *Marine Mammal Exclusion Zones* above).

The PSOs shall begin observation of the monitoring zone during all HRG survey activities, which will encompass the maximum sight distance possible, including harassment zones and exclusion zones. Observations of the monitoring zone shall continue throughout the survey activity. PSOs shall be responsible for visually monitoring and identifying marine mammals approaching or entering the established monitoring zone during survey activities.

Observations shall take place from the highest available vantage point on the survey vessel. General 360-degree scanning shall occur during the monitoring periods, and target scanning by the PSO shall occur when alerted of a marine mammal presence. For monitoring around the autonomous surface vessel (ASV), a dual thermal/HD camera shall be installed on the

mother vessel facing forward and angled in a direction so as to provide a field of view ahead of the vessel and around the ASV. PSOs shall be able to monitor the real-time output of the camera on hand-held computer tablets. Images from the cameras shall be able to be captured and reviewed to assist in verifying species identification. A monitor shall also be installed in the bridge displaying the real-time images from the thermal/HD camera installed on the front of the ASV itself, providing a further forward view of the craft. In addition, night-vision goggles with thermal clip-ons and a hand-held spotlight shall be provided and used such that PSOs can focus observations in any direction around the mother vessel and/or the ASV.

Data on all PSO observations shall be recorded based on standard PSO collection requirements. This shall include dates and locations of construction operations; time of observation, location and weather; details of the sightings (*e.g.*, species, age classification [if known], numbers, behavior, distance from the source); and details of any observed behavioral disturbances, injury or mortality). The data sheet shall be provided to both NMFS and BOEM for review and approval prior to the start of survey activities. In addition, prior to initiation of survey work, all crew members will undergo environmental training, a component of which shall focus on the procedures for sighting and protection of marine mammals. A briefing shall also be conducted between the survey supervisors and crews, the PSOs, and the Applicant. The purpose of the briefing shall be to establish responsibilities of each party, define the chains of command, discuss communication procedures, provide an overview of monitoring purposes, and review operational procedures.

Reporting Measures

The Applicant shall provide the following reports as necessary during survey activities:

Any observed significant behavioral reactions (*e.g.*, animals departing the area) or injury or mortality to any marine mammals must be reported to NMFS and BOEM within 24 hours of observation. Dead or injured protected species are reported to the NMFS Greater Atlantic Regional Fisheries Office Stranding Hotline (800-900-3622) within 24 hours of sighting, regardless of whether the injury is caused by a vessel. In addition, if the injury or death was caused by a collision with a project related vessel, the Applicant must ensure that NMFS and BOEM are notified of the strike within 24 hours. The Applicant must use the form included as Appendix A to Addendum C of the Lease to report the sighting or incident. If the Applicant is responsible for the injury or death, the vessel must assist with any salvage effort as requested by NMFS. Additional reporting requirements for injured or dead animals are described below (*Notification of Injured or Dead Marine Mammals*).

Notification of Injured or Dead Marine Mammals

In the unanticipated event that the specified activities lead to an unauthorized injury of a marine mammal or mortality (*e.g.*, ship-strike, gear interaction, and/or entanglement), Bay State Wind must immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources and the NOAA Greater Atlantic Regional Fisheries Office (GARFO) Stranding Coordinator. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;

- Water depth;
- Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the event. NMFS will work with Bay State Wind to minimize reoccurrence of such an event in the future. Bay State Wind shall not resume activities until notified by NMFS.

In the event that Bay State Wind discovers an injured or dead marine mammal and determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition), Bay State Wind shall immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources and the GARFO Stranding Coordinator. The report shall include the same information identified in the paragraph above. Activities shall be allowed to continue while NMFS reviews the circumstances of the incident. NMFS will work with the Applicant to determine if modifications in the activities are appropriate.

In the event that Bay State Wind discovers an injured or dead marine mammal and determines that the injury or death is not associated with or related to the activities authorized in the IHA (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), Bay State Wind shall report the incident to the Chief of the Permits and

Conservation Division, Office of Protected Resources, NMFS, and the NMFS Greater Atlantic Regional Fisheries Office Regional Stranding Coordinator, within 24 hours of the discovery. Bay State Wind shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS. Bay State Wind can continue its operations in such a case.

Within 90 days after completion of the marine site characterization survey activities, a technical report shall be provided to NMFS and BOEM that fully documents the methods and monitoring protocols, summarizes the data recorded during monitoring, estimates the number of marine mammals that may have been taken during survey activities, and provides an interpretation of the results and effectiveness of all monitoring tasks. Any recommendations made by NMFS must be addressed in the final report prior to acceptance by NMFS.

In addition to the Applicant's reporting requirements outlined above, the Applicant shall provide an assessment report of the effectiveness of the various mitigation techniques, *i.e.* visual observations during day and night, compared to the PAM detections/operations. This shall be submitted as a draft to NMFS and BOEM 30 days after the completion of the HRG surveys and as a final version 60 days after completion of the surveys.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering

estimates of the number of marine mammals that might be “taken” through harassment, NMFS considers other factors, such as the likely nature of any responses (*e.g.*, intensity, duration), the context of any responses (*e.g.*, critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS’s implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the environmental baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, the majority of our analyses applies to all of the species listed in Table 6, given that the anticipated effects of the HRG surveys on different marine mammal species or stocks are expected to be relatively similar in nature. Where there are meaningful differences between species or stocks, or groups of species, in anticipated individual responses to activities, impact of the expected take on the population due to differences in population status, or impacts on habitat, they are described independently in the analysis below.

As discussed in the “Potential Effects of the Specified Activity on Marine Mammals and Their Habitat” section of the proposed IHA notice and referenced above, masking, non-auditory physical effects, and vessel strike are not expected to occur. Animals in the area would likely incur no more than brief hearing impairment (*i.e.*, TTS) due to generally low SPLs—and in the case of the HRG survey equipment use, directional beam pattern, transient signals, and moving sound sources—and the fact that most marine mammals would more likely avoid a loud sound source rather than swim in such close proximity for an amount of time as to result in TTS.

Further, once an area has been surveyed, it is not likely that it will be surveyed again, therefore reducing the likelihood of repeated impacts within the project area.

Potential impacts to marine mammal habitat were discussed previously in the Proposed IHA document (83 FR 22443, May 15, 2018; see the “Potential Effects of the Specified Activity on Marine Mammals and their Habitat” section). Marine mammal habitat may be impacted by elevated sound levels and some sediment disturbance, but these impacts would be temporary and relatively short term. Feeding behavior is not likely to be significantly impacted, as marine mammals appear to be less likely to exhibit behavioral reactions or avoidance responses while engaged in feeding activities (Richardson *et al.*, 1995). Prey species are mobile, and are broadly distributed throughout the Study Area; therefore, marine mammals that may be temporarily displaced during survey activities are expected to be able to resume foraging once they have moved away from areas with disturbing levels of underwater noise. Because of the temporary nature of the disturbance, the availability of similar habitat and resources in the surrounding area, and the lack of important or unique marine mammal habitat, the impacts to marine mammals and the food sources that they utilize are not expected to cause significant or long-term consequences for individual marine mammals or their populations.

ESA-Listed Marine Mammal Species

The North Atlantic right whale population demonstrated overall growth of 2.8 percent per year between 1990 to 2010, despite a decline in 1993 and no growth between 1997 and 2000 (Pace *et al.*, 2017). However, since 2010 the population has been in decline, with a 99.99 percent probability of a decline of just under one percent per year (Pace *et al.*, 2017). In the western North Atlantic, there were estimated to be 458 whales in November 2015 (as reported in NMFS’s draft 2017 SARs and Table 2) based on a Bayesian mark-recapture open population

model, which accounts for individual differences in the probability of being photographed (95 percent credible intervals 444-471, Pace *et al.*, 2017). While photographic data for 2016 are still being processed, using this same Bayesian methodology with the available data as of September 1, 2017, gave an estimate of 451 individuals for 2016 (Pettis *et al.*, 2017a). While data are not yet available to statistically estimate the population's trend beyond 2015, three lines of evidence indicate the population is still in decline. First, calving rates in 2016 and 2017 were low, with only five new calves being documented in 2017 (Pettis *et al.*, 2017a), well below the number needed to compensate for expected mortalities (Pace *et al.*, 2017). In 2018, no new North Atlantic right whale calves were documented in their calving grounds; this represented the first time since annual NOAA aerial surveys began in 1989 that no new right whale calves were observed. Long-term photographic identification data indicate new calves rarely go undetected, so these years likely represent a continuation of the low calving rates that began in 2012 (Kraus *et al.*, 2007; Pace *et al.*, 2017). Second, as noted above, the preliminary abundance estimate for 2016 is 451 individuals, down approximately 1.5 percent from 458 in 2015. Third, since June 2017, at least 18 North Atlantic right whales have died in what has been declared an Unusual Mortality Event (UME; see additional discussion of the UME below), and at least one calf died prior to this in April 2017 (NMFS, 2017). Currently, no identified right whale recovery goals have been met (for more information on these goals, see the 2005 recovery plan; NMFS, 2005, 2017). With whaling now prohibited, the two major known human causes of mortality are vessel strikes and entanglement in fishing gear. Some progress has been made in mitigating vessel strikes by regulating vessel speeds in certain areas (78 FR 73726; December 9, 2013) (Conn and Silber, 2013), but entanglement in fishing gear remains a major threat (Kraus *et al.*, 2016).

There are currently insufficient data to determine population trends for fin whale (Waring *et al.*, 2015). There is also no exact accounting of the total number of sperm whales worldwide, but the best estimate is between 300,000 to 450,000 individuals. There is no designated critical habitat for any ESA-listed marine mammals within the Study Area, and none of the stocks for non-listed species authorized to be taken are considered “depleted” or “strategic” by NMFS under the MMPA.

ESA-listed species for which takes are authorized are sperm whales and fin whales, and these effects are anticipated to be limited to lower level behavioral effects. No take has been authorized for North Atlantic right whales.

Biologically Important Areas (BIA)

A small portion of a BIA for fin whale feeding is within the survey area. However, the portion of the fin whale feeding BIA within the HRG survey area is a very small portion of the overall BIA, and HRG activities would ensonify such a small area that fin whale foraging is not anticipated to be substantially impacted. In addition, as stated above, authorized takes are limited to Level B harassment and are anticipated to be mainly short-term and temporary behavioral harassment and it is anticipated that normal foraging activity would commence shortly after any behavioral disturbance if any were to occur.

The survey area is within a BIA for North Atlantic right whale migration with timing of importance being March – April (northward migration) and November – December (southward migration). Pregnant North Atlantic right whales migrate south, through the mid-Atlantic region of the United States, to low latitudes during late fall where they overwinter and give birth in shallow, coastal waters (Kenney, 2009). During spring, these females migrate back north with their new calves to high latitude foraging grounds where they feed on large concentrations of

copepods, primarily *Calanus finmarchicus* (NMFS, 2017). Some non-reproductive North Atlantic right whales (males, juveniles, non-reproducing females) also migrate south through the mid-Atlantic region, although at more variable times throughout the winter, while others appear to not migrate south, and instead remain in the northern feeding grounds year round or go elsewhere (Bort *et al.*, 2015; Morano *et al.*, 2012; NMFS, 2017). Bay State Wind's HRG survey activity is scheduled to begin as soon as the IHA is issued and continue for approximately 60 days, so it is anticipated that HRG survey activities would be completed prior to the months when highest densities are expected to be present, though the possibility that the survey would occur in this time period was still analyzed and no take of North Atlantic right whales has been authorized in the IHA issued to Bay State Wind, as HRG survey operations are required to shut down at 500 m to avoid any potential for behavioral harassment of this species.

Unusual Mortality Events (UME)

A UME is defined under the MMPA as “a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response.” Three UMEs are ongoing and under investigation relevant to HRG survey area. These involve humpback whales, North Atlantic right whales, and minke whales. Specific information for each ongoing UME is provided below. There is currently no direct connection between the three UMEs, as there is no evident cause of stranding or death that is common across the three species involved in the different UMEs. Additionally, strandings across the three species are not clustering in space or time.

Since January 2016, elevated humpback whale mortalities have occurred along the Atlantic coast from Maine through Florida. As of June 2018, partial or full necropsy examinations have been conducted on approximately half of the 76 known cases. Of the cases

examined, approximately half had evidence of human interaction (ship strike or entanglement). Fourteen of these investigated mortalities showed blunt force trauma or pre-mortem propeller wounds indicative of vessel strike, which is above the annual long-term average; however, these findings of pre-mortem vessel strike are not consistent across all of the whales examined and more research is needed. NOAA is consulting with researchers that are conducting studies on the humpback whale populations, and these efforts may provide information on changes in whale distribution and habitat use that could provide additional insight into how these vessel interactions occurred. Three previous UMEs involving humpback whales have occurred since 2000, in 2003, 2005, and 2006. More information is available at www.fisheries.noaa.gov/national/marine-life-distress/2016-2018-humpback-whale-unusual-mortality-event-along-atlantic-coast (accessed July 2, 2018).

Since January 2017, elevated minke whale strandings have occurred along the Atlantic coast from Maine through South Carolina, with highest numbers in Massachusetts, Maine, and New York. As of June 2018, partial or full necropsy examinations have been conducted on 18 of the 33 known cases. Preliminary findings in several of the whales have shown evidence of human interactions or infectious disease. These findings are not consistent across all of the whales examined, so more research is needed. As part of the UME investigation process, NOAA is assembling an independent team of scientists to coordinate with the Working Group on Marine Mammal Unusual Mortality Events to review the data collected, sample stranded whales, and determine the next steps for the investigation. More information is available at: www.fisheries.noaa.gov/national/marine-life-distress/2017-2018-minke-whale-unusual-mortality-event-along-atlantic-coast (accessed March 19, 2018).

Elevated North Atlantic right whale mortalities began in June 2017, primarily in Canada. To date, there are a total of 18 confirmed dead stranded whales and 1 suspected dead (12 in Canada; 6 in the United States; 1 suspected dead in the United States), and 5 live whale entanglements in Canada have been documented. Full necropsy examinations have been conducted on eleven of the cases, with results currently available for seven of these that occurred in Canada (Daoust *et al.*, 2017). Results indicate that two whales died from entanglement in fishing gear and, for four whales, necropsy findings were compatible with acute death due to trauma (although it is uncertain whether they were struck pre- or post-mortem) (Daoust *et al.*, 2017). Several investigated cases are undetermined due to advanced decomposition. Overall, findings to date confirm that vessel strikes and fishing gear entanglement continue to be the key threats to recovery of North Atlantic right whales. In response, the Canadian government has enacted fishery closures to help reduce future entanglements and has modified fixed gear fisheries, as well as implementing temporary mandatory vessel speed restrictions in a portion of the Gulf of St. Lawrence. NOAA is cooperating with Canadian government officials as they investigate the incidents in Canadian waters. A previous UME involving right whales occurred in 1996. More information is available at: www.fisheries.noaa.gov/national/marine-life-distress/2017-2018-north-atlantic-right-whale-unusual-mortality-event (accessed March 19, 2018).

The required mitigation measures are expected to reduce the number and/or severity of takes by giving animals the opportunity to move away from the sound source before HRG survey equipment reaches full energy and preventing animals from being exposed to sound levels that have the potential to cause injury (Level A harassment) and more severe Level B harassment

during HRG survey activities. Additional vessel strike avoidance requirements will further mitigate potential impacts to marine mammals during vessel transit to and within the Study Area.

Bay State Wind did not request, and NMFS is not authorizing, take of marine mammals by serious injury, or mortality. NMFS expects that most takes would primarily be in the form of short-term Level B behavioral harassment in the form of brief startling reaction and/or temporary vacating of the area, or decreased foraging (if such activity were occurring)—reactions that are considered to be of low severity and with no lasting biological consequences (*e.g.*, Southall *et al.*, 2007). This is largely due to the short time scale of the proposed activities, the low source levels and intermittent nature of many of the technologies proposed to be used, as well as the required mitigation.

In summary and as described above, the following factors primarily support our determination that the impacts resulting from this activity are not expected to adversely affect the species or stock through effects on annual rates of recruitment or survival:

- No mortality, serious injury or injury is anticipated or authorized;
- Take is anticipated to be limited to Level B behavioral harassment consisting of brief startling reactions and/or temporary avoidance of the survey area due to the intermittent and short term nature of the activities as well as the directionality of the sound sources;
- While the survey area is within areas noted as biologically important for north Atlantic right whale migration mitigation measures to shut down at 500 m are expected to avoid any take of the species. Further, although our analysis considers the potential for the activities to occur at any point during the year, they are anticipated to take place outside of the timeframe of noted importance for migration for the North Atlantic right whale

BIA

- Similarly, due to the small overlap of the survey activities with the biologically important area for fin whales, along with the size of the required shutdown, which should avoid the majority of impacts, the survey activities are not expected to affect foraging behavior of this species.
- For all species, the percentage of stocks affected are less than 9 percent of the stock. This represents the total instances of take and does not consider that there are likely repeat exposures of the same individuals, which would mean that the percentage of individuals are likely lower. In addition, these takes are anticipated to be Level B harassment takes in the form of short-term startle or avoidance reactions that would not affect the species or stock.

NMFS concludes that exposures to marine mammal species and stocks due to Bay State Wind's HRG survey activities would result in only short-term (temporary and short in duration) and relatively infrequent effects to individuals exposed, and not of the type or severity that would be expected to be additive for the very small portion of the stocks and species likely to be exposed. Animals may temporarily avoid the immediate area, but are not expected to permanently abandon the area. Major shifts in habitat use, distribution, or foraging success, are not expected. For the reasons described herein, NMFS does not anticipate the authorized take to impact annual rates of recruitment or survival.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the required monitoring and mitigation measures, NMFS finds that the total marine mammal take from Bay State Wind's proposed HRG survey activities will have a negligible impact on the affected marine mammal species or stocks.

Small Numbers

The takes authorized for the HRG survey represent 2.07 percent of the Gulf of Maine stock of humpback whale (West Indies Distinct Population Segment); 1.92 percent of the WNA stock of fin whale; 0.77 percent of the Canadian East Coast stock of minke whale; 0.22 percent of the North Atlantic stock of sperm whales; 8.66 percent of the Western North Atlantic stock of bottlenose dolphins; 0.16 percent of the WNA stock of Risso's dolphins; 0.11 percent of the WNA stock of Atlantic spotted dolphins; 0.05 percent of the WNA stock of long-finned pilot whales; 2.85 percent of the WNA stock of common dolphin; 1.02 percent of the WNA stock of Atlantic white-sided dolphin; 1.09 percent of the Gulf of Maine/Bay of Fundy stock of harbor porpoise; 2.16 percent of the WNA stock of harbor seal; and 0.56 percent of the North Atlantic stock of gray seal. These take estimates represent the percentage of each species or stock that could be taken and are small numbers relative to the affected species or stock sizes. Further, the authorized take numbers are the maximum numbers of animals that are expected to be harassed during the project; it is possible that some of these exposures may occur to the same individual, which would mean the percentage of stock taken would be smaller as it would not take into account these multiple exposures of the same individual(s). Therefore, NMFS finds that small numbers of marine mammals will be taken relative to the populations of the affected species or stocks.

Impact on Availability of Affected Species for Taking for Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

National Environmental Policy Act (NEPA)

The U.S. Bureau of Ocean Energy Management (BOEM) prepared an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA), to evaluate the issuance of wind energy leases covering the entirety of the Massachusetts Wind Energy Area (including the OCS-A 0500 Study Area), and the approval of site assessment activities within those leases (BOEM, 2014). NMFS previously adopted BOEM's EA and issued a Finding of No Significant Effect (FONSI) for similar work in 2016 (81 FR 56589, August 22, 2016).

NMFS has reviewed the BOEM EA and our previous FONSI and has determined that this action is consistent with categories of activities identified in CE B4 of the Companion Manual for NOAA Administrative Order 216-6A, which do not individually or cumulatively have the potential for significant impacts on the quality of the human environment and for which we have not identified any extraordinary circumstances that would preclude this categorical exclusion. Accordingly, NMFS has determined that the issuance of the IHA qualifies to be categorically excluded from further NEPA review. We have reviewed all comments submitted in response to the proposed IHA notice prior to concluding our NEPA process and making a final decision on the IHA request.

Endangered Species Act

The NMFS Office of Protected Resources is authorizing the incidental take fin whales, which are listed under the ESA. BOEM consulted with NMFS GARFO under section 7 of the ESA on commercial wind lease issuance and site assessment activities on the Atlantic Outer Continental Shelf in Massachusetts, Rhode Island, New York and New Jersey Wind Energy Areas. The NMFS GARFO issued a Biological Opinion concluding that these activities may

adversely affect but are not likely to jeopardize the continued existence of the North Atlantic right, fin, and sperm whale. The Biological Opinion can be found online at: www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable. Upon request from the NMFS Office of Protected Resources, the NMFS GARFO will issue an amended incidental take statement associated with this Biological Opinion to include the takes of the ESA-listed fin whale authorized through this IHA.

Authorization

NMFS has issued an IHA to Bay State Wind for conducting marine site characterization surveys offshore of Massachusetts and along potential submarine cable routes for a period of one year, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: July 24, 2018.

Donna S. Wieting,
Director, Office of Protected Resources,
National Marine Fisheries Service.

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